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ABSTRACT

This instructor's manual contains 14 units of instruction for a course on surgical technology designed to include the entry-level competencies students need to enter any of the more advanced surgical technology courses. Each unit includes some or all of the following basic components of a unit of instruction: objective sheet, suggested activities for the teacher, assignment sheets and answers to assignment sheets, written test and answers to written test, unit evaluation form, teacher supplements, transparency masters, information sheet, student supplements, and job sheets. The teacher's edition contains the following: supplementary materials on use of the publication; a competency profile; an instructional and task analysis; and a list of related academic and workplace skills. All the unit components focus on measurable and observable learning outcomes; units of instruction are designed for use in more than one lesson or class period of instruction. The 14 instructional units in this course are grouped into five sections that cover the following topics: introduction to the surgical environment (including professional responsibilities, interpersonal relationships, communication skills, and legal and ethical responsibilities); medical terminology; safety; microbiology; and pharmacology. Contains 32 references. (KC)

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Teacher Edition

MAVCC

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Second Edition

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Introduction to Surgical Technology

Teacher Edition

Table of Contents

Foreword v
Acknowledgements vii
Use of introductory materials ix
Use of this publication xi
Academic and workplace skills classifications and definitions xv
Competency profile xvii
Instructional/task analysis xxi
Related academic and workplace skills list xxxiii
References xli

Section A: Introduction to the Surgical Environment

Unit 1-A: Professional Responsibilities and Relations ST1-A-1
Unit 2-A: Interpersonal Relationships and Communication Skills ST1-A-33
Unit 3-A: Legal and Ethical Responsibilities ST1-A-65
Unit 4-A: Operating Room Environment ST1-A-83

Section B: Medical Terminology

Unit 1-B: Medical Terminology ST1-B-1

Section C: Safety

Unit 1-C: Basic Safety ST1-C-1
Unit 2-C: Workplace Safety ST1-C-27

Section D: Microbiology

Unit 1-D: Introduction to Microbiology ST1-D-1
Unit 2-D: The Infectious Process ST1-D-33
Unit 3-D: Body Defenses Against Disease ST1-D-55
Unit 4-D: Wound Healing ST1-D-73

Section E: Pharmacology

Unit 1-E: Weights and Measures ST1-E-1
Unit 2-E: Pharmacologic Agents ST1-E-19
Unit 3-E: Anesthesia ST1-E-57

Foreword

When MAVCC began the process for revising *Introduction to Surgical Technology*, we wanted to develop a set of instructional materials that would provide secondary and post-secondary students an opportunity to explore the careers in surgical technology. Much has been said about the need for students to have basic cognitive (knowing) and psychomotor (doing) skills to be successful in the workplace. After students have completed *Introduction to Surgical Technology*, *Surgical Techniques*, and *Surgical Procedures*, they should have the entry-level competencies to be successful in any of the surgical technology occupational areas.

This publication, *Introduction to Surgical Technology*, is designed to include the entry-level competencies students will need to enter any of the more advanced surgical technology courses. The success of this publication is due in large part to the capabilities of the personnel who worked with its development. Appreciation is extended to them for their valuable contributions to the publication.

These instructional materials are designed for student use and to assist teachers in organizing and improving instruction. These instructional materials are based on the curriculum alignment concept of first stating the objectives (objective sheet), developing instructional strategies for teaching to those objectives (information, assignment, and job sheets) and assessing to those same objectives (criterion-referenced evaluation instruments).

Every effort has been made to make these materials basic, readable, and by all means, usable. As with all of MAVCC's instructional materials, teachers must localize and personalize these materials to meet their community, classroom/laboratory, and individual student's situation. Teachers are encouraged to supplement the instructional materials and to develop strategies for motivating their students.

Special attention should be given to the matrix (page xxxiii) identifying basic academic skills being reinforced in these instructional materials, as well as each unit's teaching suggestions on ways to reinforce academic and workplace skills. By reinforcing these skills, the instructor should assist students in improving their employability skills.

As you use these instructional materials, we hope that you will find that they contribute to the quality of your program. If any problems occur or if you have any suggestions for improvement of the materials, please call or write us.

Mervin Birdwell, Chairman
Board of Directors
Mid-America Vocational
Curriculum Consortium

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Use of Introductory Materials

Introductory materials are included in the teacher guide only and contain useful information to assist administrators and teachers in planning for instruction.

In addition to the general information such as the table of contents, foreword, and acknowledgements page, information is included on the following:

1. **Use of this publication**—Explains the components of a unit of instruction and how they should be used as part of the teaching/ learning process.
2. **Competency profile**—Provides a record of student performance for each task included in a unit of instruction. This becomes a part of the student's permanent records and should be utilized when directing the student toward employment opportunities.
3. **Instructional/task analysis**—Provides a quick review of contents of the publication; identifies cognitive (knowledge) skills and psychomotor (doing) skills addressed in each unit of instruction.
4. **Related academic and workplace skills list**—Classifies unit tasks (assignment sheets and job sheets) according to related academic and workplace skills being reinforced. Skill areas reflected by skill groups, sub skills, and descriptions have been identified using *Workplace Basics: The Skills Employers Want*, developed by the American Society for Training and Development (ASTD) and the U.S. Department of Labor and adapted by MAVCC.
5. **Reference list**—Provides a comprehensive list of resources used in the development of this publication.

As you use these materials, it is hoped that they will provide useful information to meet a variety of needs.

Use of This Publication

Instructional units

Introduction to Surgical Technology contains fourteen units of instruction. Each instructional unit in a teacher guide includes some or all of the following basic components of a unit of instruction: objective sheet, suggested activities for the teacher, answers to assignment sheets, answers to written test, written test, unit evaluation form, teacher supplements, transparency masters, information sheet, assignment sheets, student supplements, and job sheets.

All of the unit components focus on measurable and observable learning outcomes. Teachers are encouraged to supplement, personalize, localize, and motivate with these materials in order to develop a complete teaching/learning process.

Units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the teacher will help to determine the following:

- Amount of materials that can be covered in each class period.
- Skills that must be demonstrated.
- Amount of class time needed for demonstrations.
- Amount of time needed for student practice.
- Supplementary materials, including print and nonprint media and equipment and supplies, that must be ordered.
- Resource people who must be contacted.

Objective sheet (Color code: White)

Each unit of instruction is based on performance objectives which state the goals for successful completion of the course. These performance objectives are stated in two forms: unit objectives which state the expected performance of each student after completion of the unit of instruction, and specific objectives which state what the student must do to reach the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Teachers should prepare for each unit by deciding how each objective can best be taught.

Teachers should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the teacher should remember to supply the needed information, assignment and/or job sheets, and criterion test items.

Suggested activities (Color code: Pink)

This component is included only in the teacher guide. The suggested activities assist teachers during the preparation stage of the teaching/learning process by providing an instructional plan, teaching suggestions, and a list of supplemental resources. Ways to integrate academic and workplace skills have been included in the teacher suggestions, and skill areas have been noted in bold. (A table of academic and workplace skills with accompanying definitions has been provided on page xv.) The teacher should read the suggested activities before teaching the units and decide how each objective can best be taught. Time should also be allowed to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the teacher will vary according to the particular unit.

References used in the development of each unit are listed in the suggested-activities section, along with suggested supplemental resources that may be used to teach the unit. These materials can be used by the teacher to supplement her or his knowledge of the subject area or to help students with particular interests or objectives in the area covered.

Instructions for evaluating student performance on the job sheets are also included in the suggested-activities section. Teachers should select and discuss with students the rating scale that will be used.

Assignment and written test answers (Color code: Pink)

Assignment-sheet answers and written-test answers are designed to assist the teacher in evaluation of student performances.

Written test (Color code: Yellow)

This component provides criterion-referenced evaluation of every cognitive objective listed in the unit of instruction. The test appears in the teacher guide only, but duplication is permitted for student use. If objectives have been added, deleted, or modified, appropriate changes should be made on the written test. It is recommended that the tests be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered. A selection of test items from the units covered may be used for final tests at the end of each term if desired.

Unit evaluation form (Color code: White)

This sheet provides teachers with a record of each students performance on a unit of instruction. It includes space for assignment sheet ratings, job sheet ratings, written test scores, and teacher comments. The unit evaluation form is included in the teacher guide only, but may be duplicated.

Use of This Publication

Teacher supplements (Color code: White)

This component is included only in the teacher guide. Teacher supplements are optional materials for the teacher to use. They have three purposes: to provide the teacher with higher level materials to stretch the advanced student, with remedial information or practice to assist the less-advanced student, and with state-of-the-art information in which the teacher may not have background or with information that is not readily available in other books. Some teacher supplements may be duplicated for student use and are marked accordingly.

Transparency masters (Color code: White)

Transparencies are included in the teacher guide only and are used to direct the students' attention to the topic of discussion. They may provide illustrations, charts, schematics, or additional information needed to clarify and reinforce objectives included in the unit of instruction.

Information sheet (Color code: Green)

The information sheet provides the content essential for meeting the cognitive (knowledge) objectives of the unit. Teachers will find that the information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. Students should read the information sheet before the information is discussed in class. Space is provided in margins for students and teachers to add notes that supplement, localize, personalize, or provide information for the teaching of each objective.

Student supplements (Color code: White)

Student supplements are included in the student manual. The information presented in a student supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment and/or job sheets. Students are not directly tested over the information presented in a supplement; however, their ability to apply this information may be evaluated in the completion of assignment sheets or job sheets.

Assignment sheets (Color code: Tan)

Assignment sheets provide students with pencil and paper activities that give students the opportunity to make practical application of the knowledge in the information sheet. Criteria are provided to objectively evaluate student performance.

Job sheets (Color code: Blue)

The job sheets provide criteria to objectively evaluate student performance, a list of required equipment and materials, and a step-by-step procedure for performing a psychomotor skill. The teacher should discuss the equipment and materials available in the classroom and/or laboratory and demonstrate the procedure prior to having students practice procedure. When a student is ready to be evaluated, the teacher should follow instructions for evaluating student performance which may be found in the teacher guide.

Job sheets are an important segment of each unit. Job sheets provide potential employers with a picture of the skills being taught during training and the performances that might reasonably be expected from an individual who has had this training.

Disseminating material

Material may be given out a unit or page at a time to keep the material before the student always new. Some teachers ask students to furnish a three-ring binder or folder for the current unit of study. This is convenient for students taking the material home to study. Upon completion, each unit is then placed in a larger binder. Some teachers prefer to store the material by unit in filing cabinets or boxes until needed.

For best results, provide student materials for each student. Student manuals contain objective sheets, information sheets, student supplements, assignment sheets, and job sheets. Students should be allowed to take their materials home at the end of the course.

Academic and Workplace Skills
(Classifications and Definitions)

Skill Groups	Sub Skills	Definitions
Learning Skills	Learning to learn	Developing ability to apply knowledge to other situations; knowing how to learn.
Foundation Skills	Reading	Comprehending written information and analyzing, summarizing, and applying what has been read to a specific task.
	Writing	Communicating a thought, idea or fact in written form in a clear, concise manner.
	Math	Applying computation skills such as reasoning, estimation, and problem solving as they are actually used on the job.
	Science	Applying knowledge learned through study or practice that is based on scientific principles as they relate to specific tasks.
Communication Skills	Listening	Listening for content, conversation, long-term contexts, emotional meaning, and directions.
	Oral communication	Communicating a thought, idea, or fact in spoken form in a clear, concise manner.
Adaptability Skills	Creative thinking	Using imagination to create something new—i.e. an idea, invention, work of art.
	Problem solving (critical thinking)	Recognizing and defining problems, inventing, and implementing solutions, and tracking and evaluating results.
Personal Management Skills	Self-esteem	Developing self-confidence and creating a positive self-image.
	Motivation/goal setting	Setting and meeting defined goals and objectives.
	Personal and career development	Emphasizing self-direction by establishing and implementing a plan.
Group Effectiveness Skills	Interpersonal relations	Developing ability to maintain positive relations with others.
	Negotiation	Resolving conflict between two or more individuals.
	Teamwork	Working together in a group to reach a common goal.
Influence Skills	Organizational effectiveness	Adapting to the organization's goals, values, culture, and traditional modes of operation.
	Leadership	Directing/influencing group in performance of a specific task; accepting responsibility for others.

Introduction to Surgical Technology

Competency Profile

Name: ______________________________

Directions: Evaluate the student using the rating scale below. Write the appropriate number to indicate the degree of competency achieved. The descriptions associated with each of the numbers focused on a level of student performance for each of the tasks listed. The written test scoreline is provided for optional teacher use. It may not be applicable in all cases.

Option A

Rating scale
4 - Skilled - Can perform job with no additional training
3 - Moderately Skilled - Has performed job during training program; limited additional training may be required
2 - Limited Skill - Has performed job during training program; additional training is required to develop skill
1 - Unskilled - Is familiar with process, but is unable to perform job
0 - No Exposure - No information or practice provided during training program; complete training required
NA - Non-applicable

Option B

Yes - Can perform with no additional training
No - Is unable to perform satisfactorily

SECTION A: INTRODUCTION TO THE SURGICAL ENVIRONMENT

Unit 1-A: Professional Responsibilities and Relations

______1. Draw an organizational chart.
______2. Distinguish among duties of the surgical team members.
______3. ______________________________

______Written Test Score

Unit 2-A: Interpersonal Relationships and Communication Skills

______1. Evaluate your interpersonal relationship skills.
______2. Evaluate your listening skills.
______3. Apply effective communication skills to given situations.
______4. Evaluate therapeutic communication skills in given situations.
______5. ______________________________

______Written Test Score

Unit 3-A: Legal and Ethical Responsibilities

______1. Evaluate legal cases involving surgery.
______2. Evaluate ethical issues facing medicine.
______3. ______________________________

______Written Test Score

Unit 4-A: Operating Room Environment

______1. Complete a worksheet concerning the hospital and operating room environment.
______2. Evaluate your personal health and hygiene.
______3. ______________________________

______Written Test Score

SECTION B: MEDICAL TERMINOLOGY

Unit 1-B: Medical Terminology

______1. Pronounce medical terminology.
______2. Form plurals for medical terms.
______3. Interpret medical terminology using root words and affixes.
______4. Use medical terminology to identify medical conditions and procedures.
______5. ______________________________

______Written Test Score

SECTION C: SAFETY

Unit 1-C: Basic Safety

______1. Subscribe to a safety pledge.
______2. Apply safety principles to the school and workplace.
______3. ______________________________

______Written Test Score

Unit 2-C: Workplace Safety

______1. Locate information about chemicals using an MSDS.
______2. Apply Universal Precautions to the workplace.
______3. ______________________________

______Written Test Score

SECTION D: MICROBIOLOGY

Unit 1-D: Introduction to Microbiology

______1. Research the causes and prevention of a human disease.
______2. ____________________

______Written Test Score

Unit 2-D: The Infectious Process

______1. Determine human portals of entry and exit for various diseases and infections.
______2. ____________________

______Written Test Score

Unit 3-D: Body Defenses Against Disease

______1. Complete a personal immunity survey.
______2. ____________________

______Written Test Score

Unit 4-D: Wound Healing

______1. Classify surgical and traumatic wounds.
______2. Determine types of traumatic wounds.
______3. Distinguish between positive and negative effects on wound healing.
______4. ____________________

______Written Test Score

SECTION E: PHARMACOLOGY

Unit 1-E: Weights and Measures

______1. Solve problems concerning metric equivalents.
______2. Use abbreviations for metric weights and measures.
______3. ____________________

______Written Test Score

Unit 2-E: Pharmacologic Agents

______1. Classify various drugs according to type.
______2. ____________________

______Written Test Score

Unit 3-E: Anesthesia

______1. ____

______Written Test Score

COMMENTS: ____

Evaluator: ________________________ Date:________________

* Permission to duplicate this profile is granted.

17

Introduction to Surgical Technology

Instructional/Task Analysis

SECTION A: INTRODUCTION TO THE SURGICAL ENVIRONMENT

Unit 1-A: Professional Responsibilities and Relations

Related Information: What the Student Should Know

1. Terms and definitions
2. Primary goal of surgical intervention
3. Reasons for surgical intervention
4. Types of hospitals
5. Types of ambulatory care facilities
6. Organization of medical facilities
7. Surgical personnel
8. Functions of the operating room team
9. Sterile and unsterile members of the operating room team
10. Occupational hazards of the operating room
11. Employment opportunities for the surgical technologist
12. Ways of receiving training as a surgical technologist
13. Job responsibilities and functions of the surgical technologist
14. Job responsibilities and functions of the circulator
15. Limitations of the surgical technologist
16. Desirable working traits and special demands of the surgical technologist
17. Recommended activities to promote professionalism

Application: What the Student Should Be Able to Do

18. Draw an organizational chart
19. Distinguish among duties of the surgical team members

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 2-A: Interpersonal Relationships and Communication Skills

Related Information: What the Student Should Know

1. Terms and definitions
2. Types of relationships
3. Factors needed for good relationships
4. Maslow's hierarchy of human needs
5. Terms and definitions related to communication skills
6. Goals of communication
7. Types of communication
8. Components of communication
9. Effective listening skills
10. Effective speaking skills
11. Rules for communicating on the telephone
12. Forms of communication written by surgical technologists
13. Positive and negative body language signals
14. Importance of effective communication for the patient undergoing surgery
15. Techniques for therapeutic communication
16. Blocks to therapeutic communication
17. Communication requirements while in surgery

Application: What the Student Should Be Able to Do

18. Evaluate your interpersonal relationship skills
19. Evaluate your listening skills
20. Apply effective communication skills to given situations
21. Evaluate therapeutic communication skills in given situations

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 3-A: Legal and Ethical Responsibilities

1. Terms and definitions
2. Common areas of legal responsibility in surgery affecting the surgical technologist
3. Operating room incidents that could result in litigation
4. Surgical conscience
5. Ethics
6. Surgical technologist's code of ethics
7. Standards of professional practice
8. Patient's bill of rights
9. Evaluate legal cases involving surgery
10. Evaluate ethical issues facing medicine

Unit 4-A: Operating Room Environment

1. Physical layout of the operating room suite
2. Restricted and unrestricted areas of the operating room suite
3. Equipment needed in each operating room
4. Furniture needed in each operating room
5. Components of operating room attire
6. Purposes of operating room attire
7. Criteria for operating room attire
8. General considerations of operating room attire
9. Personal health and hygiene
10. Complete a worksheet concerning the hospital and operating room environment
11. Evaluate your personal health and hygiene

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

SECTION B: MEDICAL TERMINOLOGY

Unit 1-B: Medical Terminology

1. Terms and definitions
2. Medical terminology pronunciation hints and applications
3. Rules for forming plurals
4. Prefixes and their meanings
5. Root words and their meanings
6. Suffixes and their meanings
7. Medical abbreviations
8. Medical specialists
9. Pronounce medical terminology
10. Form plurals for medical terms
11. Interpret medical terminology using root words and affixes
12. Use medical terminology to identify medical conditions and procedures

SECTION C: SAFETY

Unit 1-C: Basic Safety

1. Terms and definitions
2. Developing a good safety attitude
3. Personal safety guidelines
4. Expectations for a safe environment at school or work
5. Principles of body mechanics
6. Basic types of emergencies
7. Severe weather guidelines
8. Steps to follow in case of a bomb threat
9. Conducting a fire evacuation
10. Components of a fire
11. Classifications of fires
12. Steps in using a fire extinguisher

Related Information: What the Student Should Know	**Application: What the Student Should Be Able to Do**
Unit 1-C: Basic Safety (Cont.)	
13. Ways to prevent fires	16. Subscribe to a safety pledge
14. Electrical safety	17. Apply safety principles to the school and workplace
15. Basic equipment safety	
Unit 2-C: Workplace Safety	
1. Terms and definitions	
2. Types of hazardous materials found in the healthcare workplace	
3. OSHA regulations required of employers	
4. Hazard communication	
5. Information on a chemical label	
6. Information on a material safety data sheet (MSDS)	
7. Bloodborne pathogens	
8. Characteristics of hepatitis	
9. Characteristics of HIV and AIDS	
10. Universal Precautions	
11. Characteristics of radiation	
12. Radiation safety considerations	
13. Flammable anesthetic gases	
14. Cylinders of compressed gases and tank colors	
15. Common fire ignition sources in the operating room	
16. Types of burns	

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 2-C: Workplace Safety (Cont.)

17. Possible causes of patient thermal burns
18. Static electricity
19. Grounding of electrical equipment
20. Components of an electrosurgery unit
21. Types of electrosurgery units
22. Safeguards for using electrosurgery units
23. Safeguards for preventing electrical and fire hazards
24. Precautions for using lasers

25. Locate information about chemicals using an MSDS
26. Apply Universal Precautions to the workplace

SECTION D: MICROBIOLOGY

Unit 1-D: Introduction to Microbiology

1. Terms and definitions
2. Major classes of microorganisms
3. Microbial relationships
4. Characteristics of protozoa
5. Protozoan diseases
6. Characteristics of fungi
7. Characteristics of yeasts and molds
8. Characteristics of bacteria
9. Types of bacteria
10. Specialized structures of bacteria
11. Types of toxins produced by bacteria

Related Information: What the Student Should Know	**Application: What the Student Should Be Able to Do**
Unit 1-D: Introduction to Microbiology (Cont.)	
12. Growth requirements of bacteria	20. Research the causes and prevention of a human disease
13. Pathogenic bacteria	
14. Characteristics of rickettsiae	
15. Characteristics of helminths	
16. Characteristics of viruses	
17. Viral diseases	
18. Types of hepatitis	
19. Characteristics of AIDS	
Unit 2-D: The Infectious Process	
1. Terms and definitions	10. Determine human portals of entry and exit for various diseases and infections
2. Human portals of entry	
3. Human portals of exit	
4. Direct and indirect contact in the transmission of pathogens	
5. Occurrence of infection	
6. Types of infections	
7. Acute and chronic infections	
8. Stages of acute infection	
9. Means of controlling the transmission of infections	
Unit 3-D: Body Defenses Against Disease	
1. Terms and definitions	
2. Body defenses against disease	
3. Purposes of inflammation	

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 3-D: Body Defenses Against Disease (Cont.)

4. Symptoms of acute inflammatory response
5. Treatment of acute inflammation
6. Types of immune responses
7. Types of immunity
8. Types of acquired immunity
9. Types of vaccines
10. Allergic response
11. Anaphylaxis
12. Rejection syndrome

13. Complete a personal immunity survey

Unit 4-D: Wound Healing

1. Terms and definitions
2. Types of wound healing
3. Phases of first intention wound healing
4. Basic types of wounds
5. Classes of traumatic wounds
6. Types of traumatic wounds
7. Classifications of surgical wounds
8. Factors influencing wound healing
9. Factors making up the physical condition of a patient and their effect on healing
10. Effects of operative technique on healing
11. Types of wound disruption
12. Characteristics of wound disruption

13. Classify surgical and traumatic wounds
14. Determine types of traumatic wounds
15. Distinguish between positive and negative effects on wound healing

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

SECTION E: PHARMACOLOGY

Unit 1-E: Weights and Measures

1. Terms and definitions
2. Metric system of measurement
3. Metric prefixes
4. Metric equivalents of weight, capacity, and length
5. Advantages of the metric system
6. Abbreviations for metric weights and measures
7. Systems for measuring temperature
8. Solve problems concerning metric equivalents
9. Use abbreviations for metric weights and measures

Unit 2-E: Pharmacologic Agents

1. Terms and definitions
2. General purposes of drugs
3. Forms of drugs
4. Sources of drugs
5. Types of names that a drug may have
6. Common sources of information about drugs
7. Common classes of drugs used in surgery
8. Characteristics of anticoagulants
9. Characteristics of hemostatic agents
10. Characteristics of antibiotics/anti-infectives commonly used in surgery
11. Narcotic analgesics

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 2-E: Pharmacologic Agents (Cont.)

12. Characteristics of diuretics
13. Characteristics of steroids
14. Characteristics of oxytocics
15. Characteristics of contrast media
16. Common dyes used in surgery
17. Characteristics of intravenous solutions, blood replacements, and blood substitutes
18. Miscellaneous drugs used in surgery for emergency situations
19. Abbreviations pertaining to the handling of medications
20. Care and handling of medications
21. Procedure for the surgical technologist to accept medications from the circulator

22. Classify various drugs according to type

Unit 3-E: Anesthesia

1. Terms and definitions
2. Ideal anesthetic agent
3. Preanesthetic preparation of the patient
4. Purposes of preoperative medications
5. Selection of preoperative medications
6. Classifications of premedications
7. Types of anesthesia used
8. Sites involved in the pathway of pain

Related Information: What the Student Should Know	**Application: What the Student Should Be Able to Do**

Unit 3-E: Anesthesia (Cont.)

9. Types of anesthetics
10. Methods of administering a general anesthetic
11. Agents used for general anesthesia
12. Four phases of general anesthesia
13. Types of local or regional anesthetics
14. Agents used for local or regional anesthesia
15. Other anesthetic techniques
16. Characteristics of muscle relaxant drugs
17. Types of muscle relaxants
18. Supplemental agents used with anesthetic agents
19. Narcotic antagonists
20. Possible complications of anesthesia
21. Malignant hyperpyrexia-malignant hyperthermia syndrome
22. Actions of the surgical team if cardiac arrest occurs on the operating room table
23. OR anesthesia equipment
24. Care of the anesthetized patient

Related Academic and Workplace Skills
For *Introduction to Surgical Technology*

Task	Skill Group	Sub Skill	Description
SECTION A: INTRODUCTION TO THE SURGICAL ENVIRONMENT			
Unit 1-A: Professional Responsibilities and Relations			
Draw an organizational chart. (A.S. 1)	Foundation Skills	Reading	Applies information to new situations; determines what information is needed
	Adaptability Skills	Creative Thinking	Creates new design (chart)
	Influence Skills	Organizational Effectiveness	Identifies the organization's (hospital/operating room) mode of operation and interrelationships between departments and employees
Distinguish among duties of the surgical team members. (A.S. 2)	Foundation Skills	Reading	Analyzes and applies what has been read to specific task
	Adaptability Skills	Problem Solving	Demonstrates logical reasoning in reaching a conclusion
	Influence Skills	Organizational Effectiveness	Understands modes of operation and roles in the organization
Unit 2-A: Interpersonal Relationships and Communication Skills			
Evaluate your interpersonal relationship skills. (A.S. 1)	Foundation Skills	Reading	Draws conclusions from what is read
		Writing	Summarizes results, and makes conclusions in written form; presents conclusions in a clear, concise manner; applies rules of grammar, punctuation, capitalization, and spelling
	Adaptability Skills	Problem Solving	Recognizes problems and gives possible solutions
	Personal Management Skills	Personal and Career Development	Analyzes own personality characteristics
		Motivation/ Goal Setting	Identifies areas needing improvement
	Influence Skills	Organizational Effectiveness	Identifies characteristics desired by organization

Task	Skill Group	Sub Skill	Description
		Unit 2-A. (Cont.)	
Evaluate your listening skills. (A.S. 2)	Foundation Skills	Reading	Draws conclusions from what is read
		Writing	Summarizes results, and makes conclusions in written form; presents conclusions in a clear, concise manner; applies rules of grammar, punctuation, capitalization, and spelling
	Adaptability Skills	Problem Solving	Recognizes problems and gives possible solutions
	Personal Management Skills	Personal and Career Development	Analyzes own personality characteristics
		Motivation/ Goal Setting	Identifies areas needing improvement
	Influence Skills	Organizational Effectiveness	Identifies characteristics desired by organization
Apply effective communication skills to given situations. (A.S. 3)	Foundation Skills	Reading	Applies information and concepts derived from printed materials to job situations; draws conclusions from what is read
		Writing	Presents answers/conclusions in a clear and understandable form; applies rules of grammar, punctuation, capitalization, and spelling
Evaluate therapeutic communication skills in given situations. (A.S. 4)	Foundation Skills	Reading	Applies information and concepts derived from printed materials to job situations; draws conclusions from what is read
		Writing	Presents answers/conclusions in a clear and understandable form; applies rules of grammar, punctuation, capitalization, and spelling

Unit 3-A: Legal and Ethical Responsibilities

Task	Skill Group	Sub Skill	Description
Evaluate legal cases involving surgery. (A.S. 1)	Foundation Skills	Reading	Comprehends written information for main ideas; draws conclusions from what is read

Task	Skill Group	Sub Skill	Description
	Unit 3-A: (Cont.)		
		Writing	Presents answers/conclusions in a clear and understandable form; applies rules of grammar, punctuation, capitalization, and spelling
	Adaptability Skills	Problem Solving	Evaluates conditions; draws conclusions
	Influence Skills	Organizational Effectiveness	Identifies legal responsibilities of members of the surgical team
Evaluate ethical issues facing medicine. (A.S. 2)	Foundation Skills	Reading	Comprehends written information for main ideas; draws conclusions from what is read
		Writing	Presents answers/conclusions in a clear and understandable form; applies rules of grammar, punctuation, capitalization, and spelling; organizes information into a written report
	Communication Skills	Oral Communication	(optional) May present information as oral report; adapts presentation to audience; speaks in a clear, concise manner
	Adaptability Skills	Creative Thinking	Prepares report based on subject research, interviews, surveys
		Problem Solving	Evaluates conditions; draws conclusions
	Influence Skills	Organizational Effectiveness	Identifies ethical responsibilities of the surgical team

Unit 4-A: Operating Room Environment

Task	Skill Group	Sub Skill	Description
Complete a worksheet concerning the hospital and operating room environment. (A.S. 1)	Foundation Skills	Reading	Determines what information is needed; applies information to job situation
		Writing	Presents answers/conclusions in a clear and understandable form; applies rules of grammar, punctuation, capitalization, and spelling
	Influence Skills	Organizational Effectiveness	Understands modes of operation of the organization

Task	Skill Group	Sub Skill	Description
		Unit 4-A (Cont.)	
Evaluate your personal health and hygiene. (A.S. 2)	Foundation Skills	Reading	Draws conclusions from what is read
		Writing	Summarizes results, and makes conclusions in written form; presents conclusions in a clear, concise manner; applies rules of grammar, punctuation, capitalization, and spelling
	Adaptability Skills	Problem Solving	Recognizes problems and gives possible solutions
	Personal Management Skills	Personal and Career Development	Analyzes own health and hygiene characteristics
		Motivation/ Goal Setting	Identifies areas needing improvement
	Influence Skills	Organizational Effectiveness	Identifies characteristics desired by organization

SECTION B: MEDICAL TERMINOLOGY

Unit 1-B: Medical Terminology

Task	Skill Group	Sub Skill	Description
Pronounce medical terminology. (A.S. 1)	Foundation Skills	Reading	Applies information and concepts derived from printed materials; understands technical words
	Communication Skills	Oral Communication	Pronounces words correctly; speaks clearly
Form plurals for medical terms (A.S. 2)	Foundation Skills	Reading	Applies information and concepts derived from printed materials; understands technical words
		Writing	Applies rules for forming plurals
Interpret medical terminology using root words and affixes. (A.S. 3)	Foundation Skills	Reading	Applies information and concepts derived from printed materials; understands technical words
		Writing	Applies rules of spelling
Use medical terminology to identify medical conditions and procedures. (A.S. 4)	Foundation Skills	Reading	Applies information and concepts derived from printed materials; understands technical words
		Writing	Applies rules of spelling

Task	Skill Group	Sub Skill	Description
SECTION C: SAFETY			
Unit 1-C: Basic Safety			
Subscribe to a safety pledge (A.S. 1)	Foundation Skills	Reading	Applies information and concepts derived from printed materials; understands technical words
		Writing	Writes legibly
	Influence Skills	Organizational Effectiveness	Understands importance of safety to the organization
Apply safety principles to the school and workplace. (A.S. 2)	Foundation Skills	Reading	Determines what information is needed; obtains information from resources; applies information derived from printed materials to job situations
		Writing	Presents conclusions in a clear, concise manner; applies rules of grammer, punctuation, capitalization, and spelling
	Influence Skills	Organizational Effectiveness	Understands importance of safety to the organization
Unit 2-C: Workplace Safety			
Locate information about chemicals using an MSDS. (A.S. 1)	Foundation Skills	Reading	Determines what information is needed; obtains information from resources; applies information derived from printed materials to job situations; understands technical words
		Writing	Presents information in a clear, concise manner; applies rules of grammar, punctuation, capitalization, and spelling
		Science	Demonstrates basic understanding of chemical actions/reactions
Apply Universal Precautions to the workplace. (A.S. 2)	Foundation skills	Reading	Applies information derived from printed materials to job situations; understands technical words
		Writing	Presents information in a clear, concise manner; applies rules of grammar, punctuation, capitalization, and spelling

Task	Skill Group	Sub Skill	Description
	Unit 2-C Workplace Safety (Cont.)		
		Science	Demonstrates basic understanding of hazardous materials and infection control
	Adaptability Skills	Problem Solving	Recognizes problems and gives solutions
	Influence Skills	Organizational Effectiveness	Identifies safety precautions required in the workplace; understands importance of safety to the organization

SECTION D: MICROBIOLOGY

Unit 1-D: Introduction to Microbiology

Task	Skill Group	Sub Skill	Description
Research the causes and prevention of a human disease. (A.S. 1)	Foundation Skills	Reading	Comprehends written information for main ideas; draws conclusions from what is read
		Writing	Presents answers/conclusions in a clear and understandable form; applies rules of grammar, punctuation, capitalization, and spelling; organizes information into a written report
		Science	Demonstrates basic understanding of causes and prevention of human diseases
	Communication Skills	Oral Communication	(optional) May present information as oral report; adapts presentation to audience; speaks in a clear, concise manner
	Adaptability Skills	Creative Thinking	Prepares report based on subject research, interviews, surveys
		Problem Solving	Evaluates conditions; draws conclusions
	Influence Skills	Organizational Effectiveness	Understands importance of infection control to the organization

Task	Skill Group	Sub Skill	Description
Unit 2-D: The Infectious Process			
Determine human portals of entry and exit for various diseases and infections. (A.S. 1)	Foundation Skills	Reading	Determines what information is needed; applies information to job situation
		Writing	Presents answers/conclusions in a clear and understandable form; applies rules of grammar, punctuation, capitalization, and spelling
		Science	Demonstrates basic understanding of transmission of diseases and infections
	Influence Skills	Organizational Effectiveness	Understands importance of infection control to the organization
Unit 3-D: Body Defenses Against Disease			
Complete a personal immunity survey. (A.S. 1)	Foundation Skills	Reading	Determines what information is needed
		Writing	Completes form accurately
Unit 4-D: Wound Healing			
Classify surgical and traumatic wounds. (A.S. 1)	Foundation Skills	Reading	Determines what information is needed; applies information and concepts derived from printed materials; draws conclusions from what is read
Determine types of traumatic wounds. (A.S. 2)	Foundation Skills	Reading	Determines what information is needed; applies information and concepts derived from printed materials; draws conclusions from what is read
Distinguish between positive and negative effects on wound healing. (A.S. 3)	Foundation Skills	Reading	Determines what information is needed; applies information and concepts derived from printed materials; draws conclusions from what is read
	Influence Skills	Organizational Effectiveness	Understands importance of good surgical techniques for proper wound healing

SECTION E: PHARMACOLOGY

Unit 1-E: Weights and Measures

Task	Skill Group	Sub Skill	Description
Solve problems concerning metric equivalents. (A.S. 1)	Foundation Skills	Reading	Determines what information is needed
		Math	Calculates and converts different units of measurement
Use abbreviations for metric weights and measures. (A.S. 2)		Reading	Determines what information is needed
		Math	Uses mathematical and metric abbreviations

Unit 2-E: Pharmacologic Agents

Task	Skill Group	Sub Skill	Description
Classify various drugs according to type. (A.S. 1)	Foundation Skills	Reading	Applies information and concepts derived from printed materials; understands technical words; draws conclusions from what is read

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Professional Responsibilities and Relations
Unit 1-A

Objective Sheet

Unit Objective

After completing this unit, the student should be able to select job responsibilities and functions of surgical technologists as well as their limitations, match members of the operating room team with their duties, and select desirable working traits. The student should demonstrate these competencies by completing the assignment sheets and by scoring minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to professional responsibilities with their correct definitions.
2. State the primary goal of surgical intervention.
3. Match reasons for surgical intervention with the correct descriptions.
4. List types of hospitals.
5. Match types of ambulatory care facilities with the correct descriptions.
6. Select true statements concerning the organization of medical facilities.
7. Match surgical personnel with the correct descriptions.
8. State functions of the operating room team.
9. Distinguish between sterile and unsterile members of the operating room team.
10. List occupational hazards of the operating room.
11. List areas of employment opportunities for the surgical technologist.
12. List ways of receiving training as a surgical technologist.
13. Select job responsibilities and functions of the surgical technologist.
14. Select job responsibilities and functions of the circulator.

Objective Sheet

15. List limitations of the surgical technologist.

16. Select desirable working traits and special demands of the surgical technologist.

17. Select recommended activities to promote professionalism.

18. Draw an organizational chart. (Assignment Sheet 1)

19. Distinguish among duties of the surgical team members. (Assignment Sheet 2)

Professional Responsibilities and Relations
Unit 1-A

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Organizational Chart for Medical Facility (Objective 6)
   TM 2—OR Suite Organizational Chart (Objective 6)
   TM 3—Operating Room Team Members (Objective 9)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the student supplements. These could be used as homework assignments, daily practice exercises, or quizzes. Explain to students how you plan to evaluate the supplements, if at all.

12. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Record assignment sheet ratings and written test scores on the Unit Evaluation Form. Add any additional assignments or supplemental activities that should be part of the unit evaluation.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Discuss team spirit and its relationship to the operating room team members. This activity will emphasize **group effectiveness, interpersonal relations**, and **adaptability skills**.

2. Discuss the physical and emotional requirements of a career as a surgical technologist. Discussions such as these can reinforce the students' understanding of the surgical technology profession, develop **personal management skills**, and increase their **motivation** to learn more about the profession.

3. Discuss the procedure and process for becoming certified (how, when, why). This activity reinforces **personal** and **career development**, as well as reinforces the skills of **motivation** and **goal setting**.

4. Provide an example of a job description for a surgical technologist, and allow the students to discuss it. This activity can be used to improve **group effectiveness skills** and **problem solving skills**.

5. Provide examples of clinical ladders and have group discussion. This activity reinforces **motivation/goal setting skills**.

6. Invite a member of the local AST chapter to discuss professionalism and the benefits of belonging to the organization. Activities such as these utilize **communication skills** and **organizational effectiveness skills**.

Suggested Activities

Resources Used in Developing This Unit

1. Fuller, Joanna. *Surgical Technology: Principles and Practice.* Philadelphia: W. B. Saunders Co., 1986.
2. Atkinson, Lucy Jo. *Berry & Kohn's Operating Room Technique*, 7th ed. St. Louis: Mosby Year Book, 1992.
3. Meeker, Margaret Huth and Jane C. Rothrock. *Alexander's Care of the Patient in Surgery*, 9th ed. St. Louis: Mosby Year Book, Inc., 1991.
4. *Core Curriculum for Surgical Technology.* Littleton, CO: Association of Surgical Technologists.

Suggested Supplemental Resources

1. *National Certifying Examination for Surgical Technologists Candidate Information Booklet* (with application)
2. *Clinical Ladder for the Surgical Technologist* brochure

   1 and 2 are available from:

   Liaison Council on Certification for the Surgical Technologist
   8307 Shaffer Parkway
   Littleton, CO 80127

3. *Job Description: Certified Surgical Technologist* brochure
4. *Association of Surgical Technologist Standards of Practice*, 1989.

   3 and 4 are available from:

   Association of Surgical Technologist (AST)
   7108-C South Alton Way
   Englewood, CO 80112
   303-694-9130

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Suggested Activities

5. *Introduction to the Operating Room*, AORN videotape, 1982. 17 minutes. Explains some basic principles of patient care and the responsibilities of surgical team members.

6. *This Is Perioperative Nursing*, AORN Videotape, 1991. 15 minutes. Highlights the daily activities within the operating room.

   5 and 6 are available from:

   Cine-Med Distribution Center
   Davis and Geck Video Library
   P.O. Box 745
   Woodbury, CT 06898
   800-633-0004

7. Software—*Word Works ᵀᴹ 1, 2, 3.* Creates and prints 20 different supplemental worksheets based on input by instructor. Provides additional practice sheets on vocabulary. For IBM or Apple.

   Available from:

   EBSCO Curriculum Materials
   Box 281
   Chelsea, AL 35043-0281
   800-633-8623

   Note: This software may be useful in many units of this book for vocabulary reviews.

Professional Responsibilities and Relations
Unit 1-A

Answers to Student Supplements

Student Supplement 1

1. b
2. c
3. b
4. c
5. a
6. c
7. d
8. d
9. a
10. b

Student Supplement 2

1. F
2. T
3. T
4. T
5. T
6. F
7. T
8. F
9. T
10. F
11. F
12. F
13. F
14. T
15. T
16. F
17. F
18. T
19. T
20. F
21. F
22. F
23. T
24. T
25. T
26. F
27. T
28. F
29. T
30. T
31. F
32. F
33. T
34. T
35. T
36. T
37. F
38. T
39. T
40. T
41. F
42. T
43. F
44. T
45. T
46. T
47. T
48. T
49. T
50. T

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Professional Responsibilities and Relations
Unit 1-A

Answers to Assignment Sheets

Assignment Sheet 1—Evaluated according to stated criteria.

Assignment Sheet 2

1. C
2. C, SP
3. C
4. C
5. SP
6. C
7. SP
8. S
9. S, C, A (not SP)
10. C
11. SP, C
12. C
13. SP, C (possibly S)
14. SP
15. A
16. C
17. C, A (S, SP if not sterile)
18. C
19. SP (C, A)
20. C
21. SP, C
22. SP, S
23. SP
24. SP
25. SP
26. SP
27. C
28. SP, C
29. SP, C
30. SP, S
31. C, SP
32. C
33. C
34. C
35. C
36. C
37. SP
38. S
39. SP, C, A, S
40. SP

Professional Responsibilities and Relations
Unit 1-A

Answers to Written Test

1.
   a. 11
   b. 9
   c. 21
   d. 7
   e. 12
   f. 1
   g. 2
   h. 22
   i. 18
   j. 20
   k. 10
   l. 19
   m. 15

2. To allow the patient to be able to return to his/her best possible state of physical and mental health

3.
   a. 3
   b. 2
   c. 4
   d. 1

4. Any three of the following:

   a. Religious
   b. Proprietary
   c. Nonprofit
   d. University
   e. Government

5.
   a. 5
   b. 4
   c. 2
   d. 3

6. a, b, d, e, g

7.
   a. 4
   b. 5
   c. 7
   d. 9
   e. 1
   f. 3
   g. 2
   h. 12
   i. 11
   j. 6

8.
   a. Sterile team members—Any two of the following:
      (1) Scrub (wash) their hands and arms and don sterile gowns and gloves before entering the sterile field.
      (2) Function within the sterile field and handle only sterile items.

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Answers to Written Test

- b. Unsterile team members—Any two of the following:
  - (1) Function outside the sterile field, but assume responsibility for maintaining *sterile technique during* the operative procedure.
  - (2) Handle only supplies and equipment which are not considered sterile.
  - (3) Obtain needed supplies for the sterile team.

9. c, d, f, g

10. Any eight of the following:

    - a. Work confined to inside the hospital
    - b. Rigid adherence to established procedures
    - c. Long or irregular hours of duty
    - d. Required to dress like everyone else in the surgical environment, including proper clothing, hair coverings, and masks
    - e. Potential for developing contact dermatitis from an allergic sensitivity to latex
    - f. Considerable standing and walking during work periods
    - g. Lifting and moving of heavy equipment
    - h. Potential for exposure to radiation
    - i. Possible injury from medical or electrical equipment
    - j. Possible injury due to falls from wet floors
    - k. Possible injury due to burning and/or scalding
    - l. Possible exposure to fire
    - m. Potential exposure to chemical irritants
    - n. Potential exposure to anesthetic agents
    - o. Potential exposure to cleaning agents
    - p. Possible exposure to infectious diseases
    - q. Possible exposure to needlestick injuries, cuts, and punctures
    - r. Possible exposure to infectious wastes

11. Any five of the following:

    - a. Operating room
    - b. Emergency department/trauma center
    - c. Obstetrics department/labor and delivery room
    - d. Central processing or central service
    - e. Endoscopy unit
    - f. Cardiac catheterization lab
    - g. Tissue and retrieval team
    - h. Burn unit
    - i. Same-day/ambulatory surgery unit
    - j. Freestanding outpatient clinics
    - k. Doctors' offices
    - l. Private scrub for a surgeon
    - m. Sales representative
    - n. Traveling medical agencies
    - o. Instructor in schools of surgical technology

Answers to Written Test

12. Any two of the following:

    a. Vocational-technical school
    b. College (private or public)
    c. Armed forces

13. a. 2, 3, 4, 5, 6
    b. 2, 3, 5, 7, 8, 9
    c. 1, 2, 5

14. c, d, f, g, i, l, n, o, q

15. Any three of the following:

    a. Never administers medications in any way.
    b. Never administers anesthetic agents.
    c. Never functions in the operating room suite without proper supervision of a qualified registered nurse or physician.
    d. Never clamps tissues, places sutures, or alters body tissues in any way.
    e. Never obtains or administers blood.
    f. Never has final sign-off on OR documentation.

16. a, b, c, f

17. a, b, c, f, g, h, j

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Professional Responsibilities and Relations
Unit 1-A

Written Test

Name ______________________________ Score ______________

1. Match terms on the right with the correct definitions.

______a. During surgery

______b. To put on

______c. The process by which all microorganisms are killed

______d. Member of the surgical team who supplies the needs of the scrubbed team members, coordinates room activities, and attends to patient needs

______e. A written summary of the duties, responsibilities, and requirements of a job as it must be performed

______f. Surgical care performed under various types of anesthesia without overnight hospitalization

______g. Partial or complete loss of feeling with or without loss of consciousness

______h. Branch of medicine dealing with manual and operative procedures to correct deformities and defects, to repair injuries, and to diagnose and cure diseases

______i. Before surgery

______j. The area of the operating room where surgery is performed; involves sterile supplies and equipment, furniture covered with sterile drapes, and personnel properly dressed in sterile attire

1. Ambulatory surgery
2. Anesthesia
3. Anesthetist
4. Certified Nurse Operating Room (CNOR)
5. Certified Surgical Technologist (CST)
6. Clinical ladder
7. Circulator
8. Doctor of Osteopathy (DO)
9. Don
10. Health care team
11. Intraoperative
12. Job description
13. Medical doctor (MD)
14. Oral surgeon
15. Perioperative
16. Podiatrist (DMP)
17. Postoperative

Written Test

_______k. All personnel that contribute to the care of patients, whether directly or indirectly

_______l. Member of the surgical team who scrubs his/her hands and arms and dons sterile gowns and gloves; responsible for sterile supplies and equipment within the sterile field

_______m. Occurring in the period immediately before, during, and after surgery

18. Preoperative
19. Scrub person
20. Sterile field
21. Sterilize
22. Surgery
23. Team

2. State the primary goal of surgical intervention.

____

3. Match reasons for surgical intervention on the right with the correct descriptions.

_______a. To prevent the occurrence of a disease or illness

_______b. To relieve or alleviate symptoms, without curing the underlying cause or disease

_______c. To regain the patient's health and strength, so the patient may resume normal daily activities

_______d. To determine the nature and cause of an illness

1. Diagnostic
2. Palliative
3. Prophylactic
4. Restorative

4. List three types of hospitals.

a. ____

b. ____

c. ____

Written Test

5. Match types of ambulatory care facilities on the right with the correct descriptions.

_______a. Operating rooms for ambulatory care are separated from inpatient surgical suites; suites are within or attached to a hospital

_______b. Facility that is owned and operated by a hospital, but that is physically separated from the hospital

_______c. Independent facility that is privately owned and operated, often by a group of physicians

_______d. Part of a physician's office that is equipped to perform surgery

1. Combined hospital-based units
2. Freestanding ambulatory surgery center
3. Office-based surgery center
4. Satellite surgery center
5. Self-contained hospital-based units

6. Select true statements concerning the organization of medical facilities by placing an "X" in the appropriate blanks.

_______a. The operating room where surgical intervention is performed is only one part of the larger unit, the operating room suite.

_______b. The operating suite, similarly, is only one part of the larger unit, the medical facility itself.

_______c. All people in the medical facility function in direct relationship with the patient.

_______d. Every employee's job is important, and each person has a job to perform that fits into the general scheme of the medical facility.

_______e. The surgical technologist should know his/her relationship to other individuals and departments in the medical facility.

_______f. Only large medical facilities develop organizational charts.

_______g. The organizational chart demonstrates the direct and associated lines of authority and is a pattern of control that links together responsibilities within the structure.

_______h. Only supervisors need to follow the lines of authority when dealing with a problem.

Written Test

7. Match surgical personnel on the right with the correct descriptions.

______a. Is directly responsible for everything and everyone in the operating room suite

______b. A specially trained nonphysician allied health care worker who is qualified to perform procedures in the operating room and in other areas of care of the surgical patient

______c. Assists the Director of Surgery with the management of the OR suite

______d. A physician who assists the primary surgeon with the surgical procedure; handles tissue and uses instruments

______e. Specially trained physician who provides anesthesia to surgical patient

______f. Maintains records and reports, orders supplies, and assists in scheduling surgeries

______g. Specially trained nurse who provides anesthesia to the surgical patient

______h. Primarily functions as the scrub person on the surgical team

______i. A licensed physician who performs the operative procedures

______j. Cleans, processes, and stores instruments and supplies; performs housekeeping duties; and assists with transportation and positioning of patients

1. Anesthesiologist
2. Certified Registered Nurse Anesthetist (CRNA)
3. Clerical person
4. Director of Surgery
5. Nonphysician First Assistant
6. Nursing assistant/ orderly
7. Operating Room Clinical Manager
8. Operating Room Registered Nurse
9. Physician First Assistant
10. Second Assistant to Surgeon
11. Surgeon
12. Surgical technologist

Written Test

8. State two functions of the operating room team.

   a. Sterile team members

      (1) ______________________________

      (2) ______________________________

   b. Unsterile team members

      (1) ______________________________

      (2) ______________________________

9. Distinguish between sterile and unsterile members of the operating room team by placing an "X" next to the sterile members.

______a. Anesthesiologist

______b. X-ray technician

______c. Surgeon's assistant

______d. Surgeon

______e. Circulator - Registered nurse

______f. Scrub person - Surgical technologist

______g. Scrub person - Registered nurse

______h. Circulator - Surgical technologist

10. List eight occupational hazards of the operating room.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

   e. ______________________________

   f. ______________________________

   g. ______________________________

   h. ______________________________

Written Test

11. List five areas of employment opportunities for the surgical technologist.

    a. ______________________________

    b. ______________________________

    c. ______________________________

    d. ______________________________

    e. ______________________________

12. List two ways of receiving training as a surgical technologist.

    a. ______________________________

    b. ______________________________

13. Select from the following list the appropriate job responsibilities and functions of the surgical technologist as a scrub person by placing an "X" in the appropriate blanks.

    a. Preoperative

    ______ (1) Schedules operating rooms.

    ______ (2) Checks supplies and equipment needed for surgical procedure.

    ______ (3) Assists the circulator in opening all sterile supplies needed for the procedure.

    ______ (4) May assist in the transportation of patients into the surgical suite.

    ______ (5) May assist with positioning the patient on the surgery table.

    ______ (6) Assists in draping the patient with sterile drapes.

    ______ (7) Attaches suction tubing and electrosurgical cords to the power sources.

    ______ (8) Assists in recovery by monitoring vital signs.

    ______ (9) Assists surgeon with patient record keeping and postoperative care.

Written Test

b. Intraoperative

_______ (1) Keeps the family informed.

_______ (2) Counts sponges, needles, and instruments in prescribed manner at appropriate times before, during, and after surgery with circulator.

_______ (3) Maintains an orderly surgical field.

_______ (4) Anticipates the circulator's needs.

_______ (5) Assists surgeon when needed by retracting tissue, cutting sutures, sponging and suctioning blood from the wound, or irrigating the wound.

_______ (6) Chats with the surgeon.

_______ (7) Anticipates the surgeon's needs by watching the progress of the surgery and by knowing the steps of the procedure involved.

_______ (8) Passes instruments, supplies, and equipment to surgeon in a prescribed manner.

_______ (9) Identifies and cares for specimens received during surgery in prescribed manner.

_______(10) Connects electrical equipment to power sources during surgery.

c. Postoperative

_______ (1) Assists with dressing.

_______ (2) May assist with moving patient to stretcher or bed.

_______ (3) Disposes of all sharps in trash.

_______ (4) Leaves instruments and supplies for clean-up crew.

_______ (5) Keeps equipment in operating condition, and sends for repairs as needed.

_______ (6) Accompanies patient to post-anesthesia recovery room.

Written Test

14. Select from the following list the appropriate job responsibilities and functions of the circulator by placing an "X" in the appropriate blanks.

_______a. Assists with opening unsterile supplies before surgery and as needed during surgery.

_______b. Counts sponges, needles, and instruments with Anesthesiologist in prescribed manner at appropriate times before, during, and after surgery, and documents these counts.

_______c. Greets and properly identifies patient.

_______d. Anticipates the needs of the scrubbed team.

_______e. Assists surgical technologist with preparing sterile supplies when needed.

_______f. Positions patient on surgery table.

_______g. Prepares the operative site by performing the scrub prep, and possibly the shave prep if needed.

_______h. Assists the surgeon with surgery when needed.

_______i. Checks and connects electrical equipment to power sources, and connects suction to vacuum.

_______j. Ties gowns of unsterile team members.

_______k. Handles all sterile equipment in the room during surgery.

_______l. Anticipates the needs of the sterile team.

_______m. Leaves operating room as soon as surgical procedure begins.

_______n. Keeps discarded sponges collected.

_______o. Completes and maintains accurate operative records.

_______p. Disposes of all specimens received from the scrub person.

_______q. Observes for any breaks in aseptic technique.

_______r. Sends for orderly to decontaminate floor or equipment promptly during operation if contaminated by blood or body fluids.

_______s. Avoids "Universal Precautions" by not wearing gloves any time contact with body fluids is anticipated.

Written Test

15. List three limitations of the surgical technologist.

a. ____________________

b. ____________________

c. ____________________

16. Select desirable working traits and special demands of the surgical technologist by placing an "X" in the appropriate blanks.

______a. Have respect for the rights, privacy, and property of others

______b. Be able to communicate effectively

______c. Be able to spot flaws or imperfections quickly and accurately

______d. Be willing to perform only pleasant tasks

______e. Be satisfied with the amount of education you have, and not desire any more

______f. Be able to function under stress

17. Select recommended activities to promote professionalism by placing an "X" in the appropriate blanks.

______a. Attend and participate in inservice educational programs.

______b. Understand job functions and responsibilities as listed in job description.

______c. Participate in professional organizations.

______d. Participate in social organizations.

______e. Attend church regularly.

______f. Perform job responsibilities in an ethical and professional manner.

______g. Attend workshops, institutes, and conventions when pertinent to professional growth.

______h. Become certified and remain current.

______i. Campaign for local, state, and national political candidates that are endorsed by your hospital.

______j. Participate in clinical ladder program if implemented by employer.

***Permission to duplicate this test is granted.**

Professional Responsibilities and Relations
Unit 1-A

Unit Evaluation Form

Student Name ______________________ Unit Rating ________

Assignment Sheet 1—Draw an Organizational Chart Rating ______

Comments: ____

____

Assignment Sheet 2—Distinguish Among Duties of the Surgical Team Members Rating ______

Comments: ____

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

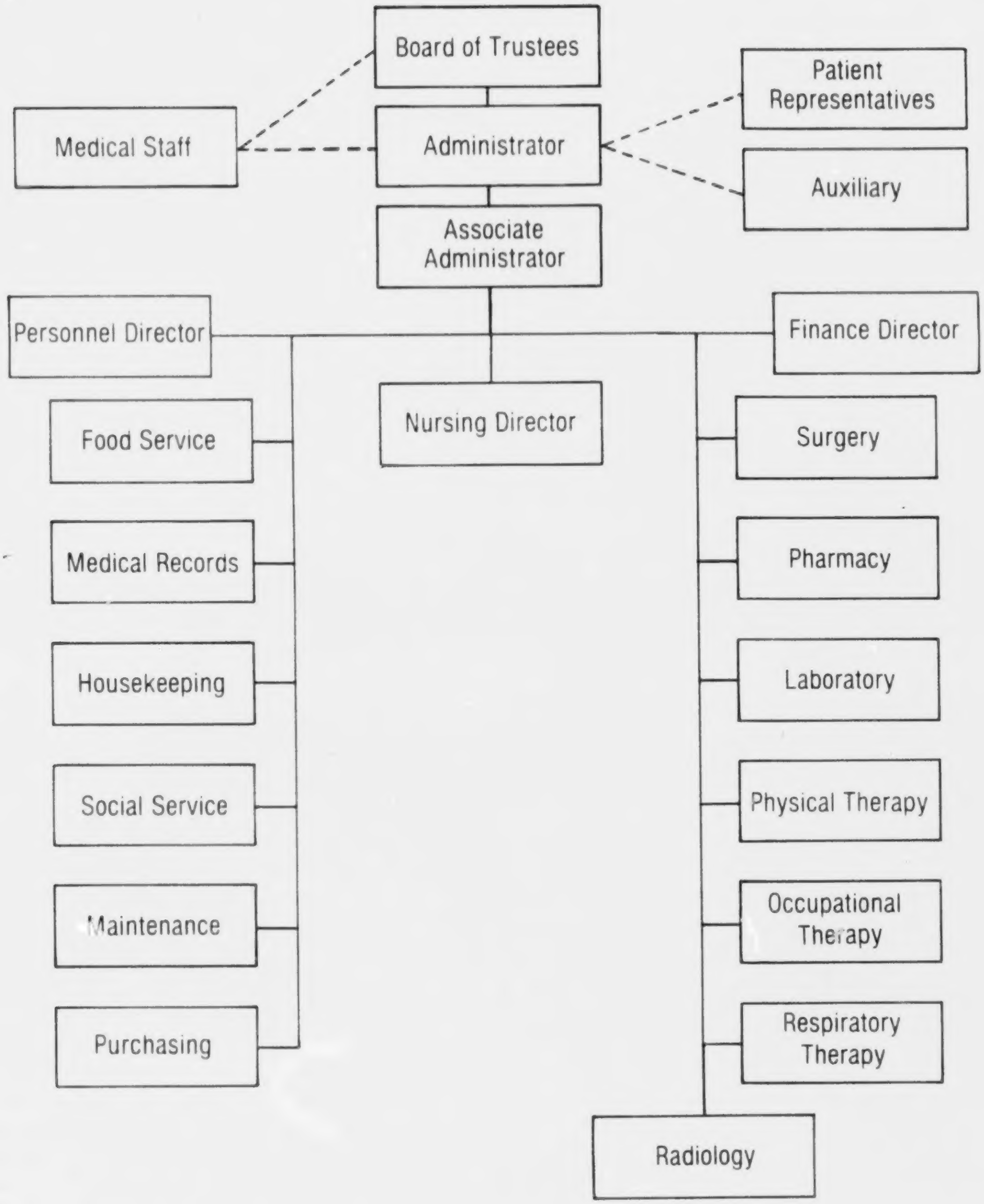
____

Teacher Signature ______________________ Date ________

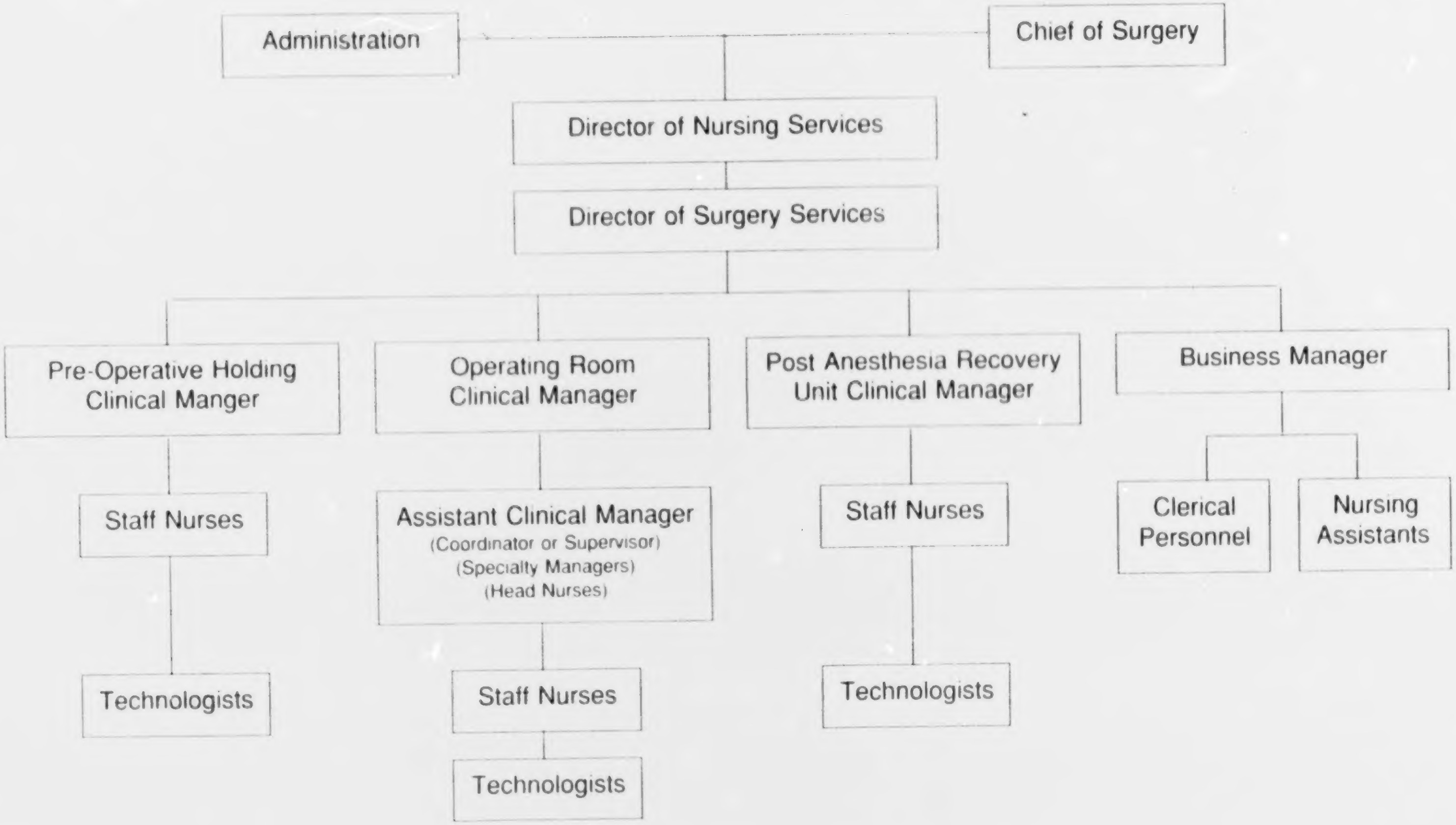
Student Signature ______________________ Date ________

***Permission to duplicate this form is granted.**

Organizational Chart for Medical Facility


Board of Trustees
Medical Staff
Administrator
Patient Representatives
Auxiliary
Associate Administrator
Personnel Director
Finance Director
Nursing Director
Food Service
Medical Records
Housekeeping
Social Service
Maintenance
Purchasing
Surgery
Pharmacy
Laboratory
Physical Therapy
Occupational Therapy
Respiratory Therapy
Radiology

OR Suite Organizational Chart

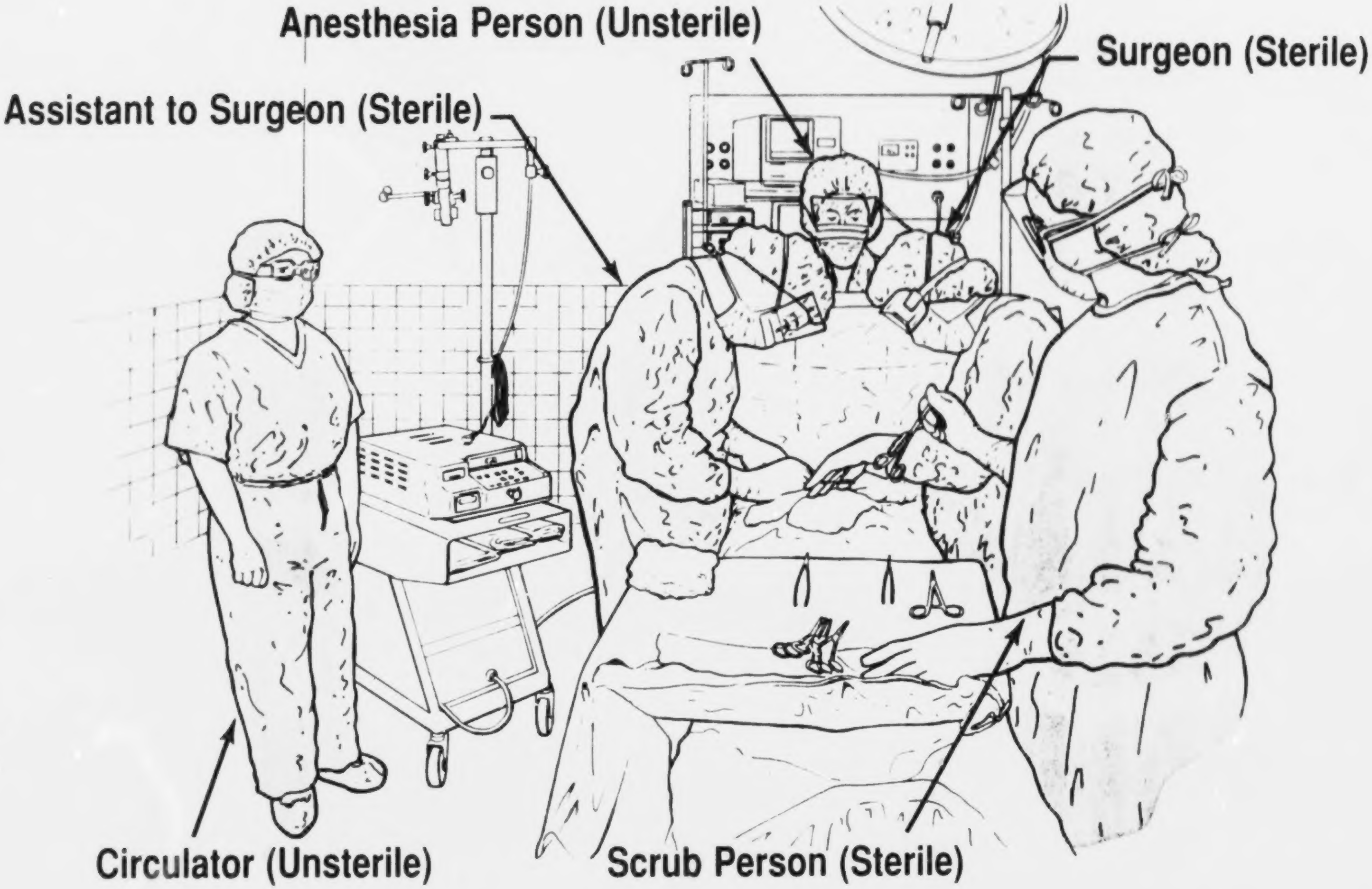


- Administration
- Chief of Surgery
  - Director of Nursing Services
    - Director of Surgery Services
      - Pre-Operative Holding Clinical Manger
        - Staff Nurses
          - Technologists
      - Operating Room Clinical Manager
        - Assistant Clinical Manager (Coordinator or Supervisor) (Specialty Managers) (Head Nurses)
          - Staff Nurses
            - Technologists
      - Post Anesthesia Recovery Unit Clinical Manager
        - Staff Nurses
          - Technologists
      - Business Manager
        - Clerical Personnel
        - Nursing Assistants

Introduction to Surgical Technology, Unit 1-A
Teacher Page 27

TM 2

Operating Room Team Members


Anesthesia Person (Unsterile)
Surgeon (Sterile)
Assistant to Surgeon (Sterile)
Circulator (Unsterile)
Scrub Person (Sterile)

Professional Responsibilities and Relations
Unit 1-A

Information Sheet

1. **Terms and definitions**

   a. **Ambulatory surgery** — Surgical care performed under various types of anesthesia without overnight hospitalization

   b. **Anesthesia** — Partial or complete loss of feeling with or without loss of consciousness

   c. **Anesthetist** — Person who has been trained to administer an anesthetic

   d. **Certified Nurse Operating Room (CNOR)** — A certified perioperative nurse who has acquired additional knowledge and skills through organized instruction and supervised practice

      Note: Certification is a voluntary program designed for nurses who provide patient care during the pre-, intra-, and post-operative periods.

   e. **Certified Surgical Technologist (CST)** — Surgical technologist (ST) who has earned a professional credential by passing the national certifying examination

      Note: This certifying exam is administered by the Liaison Council on Certification for the Surgical Technologist (LCC-ST).

   f. **Clinical ladder** — A competency-based tool utilized to recognize and reward clinical expertise; designed to give employees the opportunity for professional growth, and provides a way for employees to be recognized and rewarded by demonstrating their clinical expertise

   g. **Circulator** — Member of the surgical team who supplies the needs of the scrubbed team members, coordinates room activities, and attends to patient needs

   h. **Doctor of Osteopathy (DO)** — A doctor who practices osteopathy, which is a system of medical practice based on a theory that diseases are mainly due to a loss of structural integrity which can be restored first by manipulation of the body parts and second by the use of therapeutic measures such as physical, medicinal, and surgical techniques

   i. **Don** — To put on

   j. **Health care team** — All personnel that contribute to the care of patients, whether directly or indirectly

Information Sheet

k. **Intraoperative** — During surgery

l. **Job description** — A written summary of the duties, responsibilities, and requirements of a job as it must be performed

m. **Medical Doctor (MD)** — Licensed physician

n. **Oral surgeon** — Dentist with advanced specialty education and training to perform oral and maxillofacial surgery

Note: The oral surgeon's dental degree may be a DDS (Doctor of Dental Surgery) or DMD (Doctor of Dental Medicine), depending on the school.

o. **Perioperative**—Occurring in the period immediately before, during, and after surgery

p. **Podiatrist (DMP)** — A physician who specializes in the care of conditions and functions of the human feet: may perform surgical procedures, prescribe corrective devices and drugs, and physical therapy

q. **Postoperative** — After surgery

r. **Preoperative** — Before surgery

s. **Scrub person** — Member of the surgical team who scrubs his/her hands and arms and dons sterile gowns and gloves; responsible for sterile supplies and equipment within the sterile field

Note: The scrub person may be a registered nurse, a licensed practical/vocational nurse, or a surgical technologist.

t. **Sterile field** — The area of the operating room where surgery is performed; involves sterile supplies and equipment, furniture covered with sterile drapes, and personnel properly dressed in sterile attire

u. **Sterilize** — The process by which all microorganisms are killed

v. **Surgery** — Branch of medicine dealing with manual and operative procedures to correct deformities and defects, to repair injuries, and to diagnose and cure diseases

w. **Team** — A group of people who work together to achieve common goals

Information Sheet

2. **Primary goal of surgical intervention** — To allow the patient to be able to return to his/her best possible state of physical and mental health

   Note: It is recognized that not every patient will return to a state of wellness due to the nature of some terminal illnesses. In these cases, the health team members will work together to ease the patient's pain and discomfort.

3. **Reasons for surgical intervention**

   a. **Diagnostic** — To determine the nature and cause of an illness

   b. **Palliative** — To relieve or alleviate symptoms, without curing the underlying cause or disease

   c. **Prophylactic** (preventive) — To prevent the occurrence of a disease or illness

   d. **Restorative** (curative) — To regain the patient's health and strength, so the patient may resume normal daily activities

4. **Types of hospitals** (according to type of ownership)

   a. Religious

   b. Proprietary (privately owned and managed)

   c. Nonprofit

   d. University

   Note: University supported hospitals are frequently engaged in medical research projects and training programs for students entering health professions and occupations.

   e. Government

   Example: Veteran's Administration (VA) hospital

   Note: There are also specialized hospitals that treat one type of health problem, or limit its care to one type of patient such as children's hospitals, burn centers, and hospices.

Information Sheet

5. **Types of ambulatory care facilities**

    a. **Hospital-based units**—Surgery suites are within or attached to a hospital

        (1) Self-contained units — Operating rooms for ambulatory care are separated from inpatient surgical suites

        (2) Combined units — Outpatients share the same operating room suite and other hospital facilities with inpatients, but have a separate preoperative holding area

        Note: Inpatients have been admitted to the hospital; outpatients or ambulatory care patients have not.

    b. **Satellite surgery center** — Facility that is owned and operated by a hospital, but that is physically separated from the hospital

    c. **Freestanding ambulatory surgery center** — Independent facility that is privately owned and operated, often by a group of physicians

    d. **Office-based surgery center** — Part of a physician's office that is equipped to perform surgery

    Note: Terms used to describe ambulatory care include same day surgery, outpatient surgery, and ambulatory surgery.

6. **Organization of medical facilities**

    a. The operating room (OR) where surgical intervention is performed is only one part of the larger unit, the operating room suite.

    b. The operating room suite, similarly, is only one part of the larger unit, the medical facility.

    c. Many people function in the medical facility, in both direct and indirect relationship with the patient.

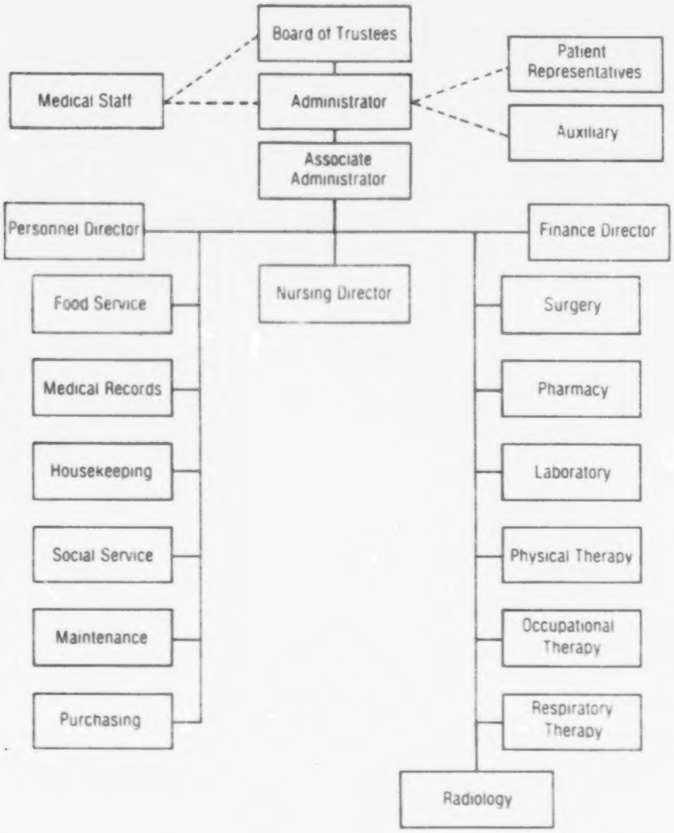
    d. Every employee's job is important, and each person has a job to perform that fits into the general scheme of the medical facility.

    e. The surgical technologist should know his/her relationship to other individuals and departments in the medical facility.

Information Sheet

f. Each medical facility, no matter how large or small, develops an organizational chart to show how all employees and their departments are related in the whole facility.

Figure 1—Example of organizational chart for a medical facility

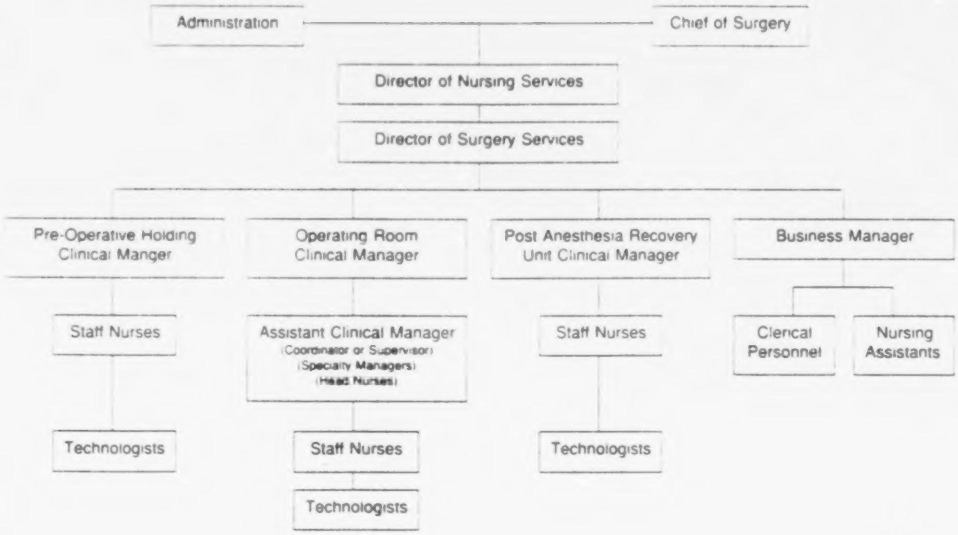

Board of Trustees
Medical Staff
Administrator
Patient Representatives
Auxiliary
Associate Administrator
Personnel Director
Finance Director
Food Service
Nursing Director
Surgery
Medical Records
Pharmacy
Housekeeping
Laboratory
Social Service
Physical Therapy
Maintenance
Occupational Therapy
Purchasing
Respiratory Therapy
Radiology

g. The organizational chart demonstrates the direct and associated lines of authority and is a pattern of control that links together responsibilities within the structure.

Information Sheet

h. It is important that everyone within the organization follow the lines of authority when dealing with a problem. By using this appropriate method, the immediate superior can take action to accomplish the goals of the department.

Figure 2—Example of OR suite organizational chart


Administration
Chief of Surgery
Director of Nursing Services
Director of Surgery Services
Pre-Operative Holding Clinical Manger
Operating Room Clinical Manager
Post Anesthesia Recovery Unit Clinical Manager
Business Manager
Staff Nurses
Assistant Clinical Manager (Coordinator or Supervisor) (Specialty Managers) (Head Nurses)
Staff Nurses
Clerical Personnel
Nursing Assistants
Technologists
Staff Nurses
Technologists
Technologists

7. **Surgical personnel and their descriptions**

a. **Director of Surgery** — May be a physician or registered nurse who is directly responsible for everything and everyone in the operating room suite

b. **Operating Room Clinical Manager** — Usually a registered nurse who assists the Director of Surgery with the management of the OR suite

c. **Surgeon** — A licensed physician who performs the operative procedures

Note: A surgeon may be a licensed physician (MD), osteopath (DO), oral surgeon (DMD or DDS), or podiatrist (DPM) with special training to perform operative procedures.

d. **Physician First Assistant** — A physician who assists the primary surgeon with the surgical procedure; handles tissue and uses instruments

Note: If the surgeon should become unable to perform the necessary duties of patient care, a physician first assistant is capable of assuming the responsibilities of the surgeon.

Information Sheet

e. **Nonphysician First Assistant** — A specially trained nonphysician allied health care worker who is qualified to perform procedures in the operating room and in other areas of care of the surgical patient

Note: A nonphysician first assistant must complete a formal educational program for first assisting or receive special training that includes both psychomotor and cognitive learning. He/She may be employed by the surgeon or by the hospital, but must receive approval from the medical staff of the affiliating hospital.

Examples of nonphysician first assistants:

(1) Physician assistant (PA) — Generic term used to denote nonphysician first assistant

(2) Certified Nurse Operating Room (CNOR)

(3) Certified Surgical Technologist (CST) who has received special training to first assist

f. **Second Assistant to Surgeon** — A qualified surgical technologist or nurse, working under the supervision of the surgeon, who is not involved in the actual performance of the procedure, but assists the surgeon by retracting tissue and suctioning body fluids to provide adequate exposure of the operative site

g. **Anesthesiologist** — A licensed physician specializing in anesthesiology who provides anesthesia to surgical patient

h. **Certified Registered Nurse Anesthetist** (CRNA) — Specially trained nurse who provides anesthesia to the surgical patient

i. **Operating Room Registered Nurse** — A registered nurse who generally functions as the circulator and supervises all nursing activities in the operating room

Note: A registered nurse may serve as a scrub person on another surgical team.

Information Sheet

j. **Surgical technologist** — A health care team member who primarily functions as the scrub person on the surgical team; works with the surgeon, anesthesiologist or anesthetist, and registered nurse to provide direct patient care during surgical intervention

   Note: A licensed practical nurse (LPN) or a licensed vocational nurse (LVN) may function in the same capacity as the surgical technologist in the operating room.

k. **Nursing assistants/orderlies** — Unlicensed trained workers who clean, process, and store instruments and supplies; perform housekeeping duties; and assist with transportation and positioning of patients

l. **Clerical personnel** — Ancillary workers who maintain records and reports, order supplies, and assist in scheduling surgeries

8. **Functions of the operating room team**

   a. Sterile team members

      (1) Scrub (wash) their hands and arms and don sterile gowns and gloves before entering the sterile field.

      (2) Function within the sterile field and handle only sterile items.

   b. Unsterile team members

      (1) Function outside the sterile field, but assume responsibility for maintaining sterile technique during the operative procedure.

      (2) Handle only supplies and equipment which are not considered sterile.

      (3) Obtain needed supplies for the sterile team.

Information Sheet

9. Members of the operating room team

a. **Sterile team members**

(1) Surgeon

(2) Assistants to the surgeon

(a) Physician first assistant

(b) Nonphysican first assistant

(c) Second assistant to surgeon

(3) Scrub person

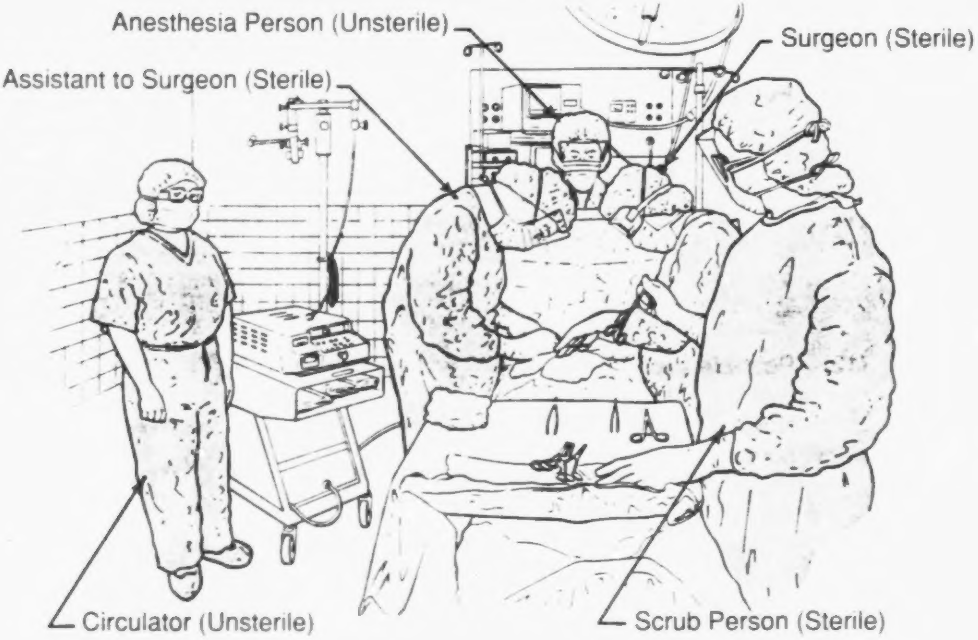
b. **Unsterile team members**

(1) Anesthesia person

(2) Circulator

(3) Others such as X-ray technician or perfusionist

Figure 3—Operating room team members


Anesthesia Person (Unsterile)
Surgeon (Sterile)
Assistant to Surgeon (Sterile)
Circulator (Unsterile)
Scrub Person (Sterile)

Information Sheet

10. Occupational hazards of the operating room

a. Physical

(1) Work confined to inside the hospital

(2) Rigid adherence to established procedures

(3) Long or irregular hours of duty

Note: Duty hours are subject to the Fair Labor Standards Act and may include week-end and/or emergency call-back duty.

(4) Required to dress like everyone else in the surgical environment, including proper clothing, hair coverings, and masks

(5) Potential for developing contact dermatitis from an allergic sensitivity to latex in gloves

Note: If a sensitivity to gloves develops, you may have to make a career change.

(6) Considerable standing and walking during work periods

(7) Lifting and moving of heavy equipment

(8) Potential for exposure to radiation

(9) Possible injury from medical or electrical equipment

(10) Possible injury due to falls from wet floors

(11) Possible injury due to burning and/or scalding

Example: Malfunctioning autoclave or sterilizing equipment may cause burns.

(12) Possible exposure to fire

Note: Fire, explosion, and electrical shock are potential hazards of laser surgery.

Information Sheet

b. Chemical

   (1) Potential exposure to chemical irritants

   Examples: Glutaraldehyde (Cidex) is a solution used to chemically disinfect instruments. Its fumes may be irritating to eyes, nose, and throat. It can also cause a contact dermatitis. Vapors from formalin, a solution used to preserve tissue specimens, are toxic to the respiratory tract.

   (2) Potential exposure to anesthetic agents

   Note: Anesthetic gases are suspected to have toxic effects on the liver, kidneys, and reproductive organs. National studies indicate that OR personnel are at an increased risk for spontaneous abortion, hepatic disease, congenital abnormalities, renal disease, and cancer. Safety factors are imposed to prevent contamination of room air with anesthetic vapors.

   (3) Potential exposure to cleaning agents

c. Biologic

   (1) Possible exposure to infectious diseases

   Examples: HIV (leading to AIDS), hepatitis

   (2) Possible exposure to needlestick injuries, cuts, and punctures

   (3) Possible exposure to infectious wastes

11. **Areas of employment opportunities for the surgical technologist**

a. Operating room

Note: The technologist may be employed by the hospital or privately employed by the surgeon as a private scrub.

b. Emergency department/trauma center

c. Obstetrics department/labor and delivery room

d. Central processing or central service

e. Endoscopy unit

Information Sheet

f. Cardiac catheterization lab

g. Tissue and retrieval team

h. Burn unit

i. Same-day/ambulatory surgery unit

j. Freestanding outpatient clinics

k. Doctors' offices

l. Private scrub for a surgeon

m. Sales representative

Example: Instrument sales

n. Traveling medical agencies

Note: These agencies may contract with surgical technologists to travel to different areas to take care of personnel shortages.

o. Instructor in schools of surgical technology

12. Ways of receiving training as a surgical technologist

a. Vocational-technical school

b. College (private or public)

c. Armed forces

Note: In some hospitals in the past surgical technologists only received on-the-job (OJT) training without additional education. However, because surgery and medicine have become much more complex and technologically advanced, OJT alone is an obsolete method for becoming a surgical technologist.

Information Sheet

13. **Job responsibilities and functions of the surgical technologist as a scrub person**

    a. Preoperative:

        (1) Makes sure OR room has been properly cleaned.

        (2) Arranges OR furniture so that those pieces that will become part of the sterile field are at least 18 inches away from cabinets and wall.

        (3) Removes any unnecessary equipment from room.

        (4) Checks supplies and equipment needed for surgical procedure.

        (5) If time allows, the scrub person may assist the circulator in opening all sterile supplies needed for the procedure.

        (6) May assist in the transportation of patients into the surgical suite.

        (7) May assist with positioning the patient on the surgery table.

        (8) Performs surgical hand wash.

        (9) Dons sterile gown and gloves.

        (10) Prepares sterile field by assembling supplies and equipment.

        (11) Counts sponges, needles, and instruments with circulator.

        (12) Gowns and gloves the surgeon and assistants as soon as they enter the room.

        (13) Assists in draping the patient with sterile drapes.

        (14) Attaches suction tubing and electrosurgical cords to the sterile field.

    b. Intraoperative:

        (1) Provides direct patient care.

        (2) Passes instruments, supplies, and equipment to surgeon in a prescribed manner.

        (3) Anticipates the surgeon's needs by watching the progress of the surgery and by knowing the steps of the procedure involved.

        (4) Maintains an orderly surgical field.

Information Sheet

(5) Maintains **aseptic technique**.

(6) Keeps instruments as clean as possible.

(7) Assists surgeon when needed by retracting tissue, cuttin sponging and suctioning blood from the wound, or irrigating t

Note: In many areas, these are duties that are assumed b Assistant.

(8) Counts sponges, needles, and instruments with circulator in manner at appropriate time.

(9) Identifies and cares for specimens received during surgery in manner.

(10) After receiving medication onto the sterile field from the regist prepares and passes medications to surgeon.

c. Postoperative

(1) Assists with dressing.

(2) Sees that patient is clean.

Example: Washes off blood.

(3) May assist with moving patient to stretcher or bed.

(4) Performs proper clean up of equipment and supplies.

(5) Disposes of all sharps (needles, blades) in proper waste rec

(6) May prepare instruments and supplies for decontamination.

(7) Keeps equipment in operating condition, and sends for repairs

(8) Assists in ordering and stocking supplies to maintain a curre

Note: If a surgical technologist has specialized in a cert specialty such as orthopedics or urology, they may be asked additional responsibilities for ordering supplies and caring for instruments.

Information Sheet

14. Job responsibilities and functions of the circulator

a. Assists with opening unsterile supplies before surgery and as needed during surgery.

b. Counts sponges, needles, and instruments with scrub in prescribed manner at appropriate times before, during, and after surgery, and documents these counts.

c. Greets and properly identifies patient.

d. Provides direct perioperative patient care.

e. Assists in transporting patient before and after surgery.

f. Positions patient on surgery table.

g. Prepares the operative site by performing the scrub prep, and possibly the shave prep if needed.

Note: Usually the shave prep is done before the patient enters the surgical suite.

h. Assists the anesthesia person when needed.

i. Checks and connects electrical equipment to power sources, and connects suction to vacuum.

j. Ties gowns of sterile team members.

k. Handles all nonsterile equipment in the room during surgery.

l. Anticipates the needs of the sterile team.

m. Stays in the room, and informs scrub person when leaving.

n. Keeps discarded sponges collected.

o. Obtains blood products for transfusion as directed.

p. Obtains and prepares all medications needed during the procedure.

q. Completes and maintains accurate operative records.

r. Is ultimately responsible for the care of specimens received from the scrub person.

s. Observes for any breaks in aseptic technique.

Information Sheet

t. Decontaminates floor or equipment promptly during operation if contaminated by blood or body fluids.

u. Practices "Universal Precautions" by wearing gloves any time contact with body fluids is anticipated.

Note: Universal precautions will be covered in detail in the Safety Section of this book.

v. Tapes post-operative dressing.

w. May accompany patient to Post-Anesthesia Recovery Room to give a nursing report of patient's progress and condition.

15. Limitations of the surgical technologist

a. Never administers medications in any way.

Note: Medications must be selected and measured by a licensed nurse.

b. Never administers anesthetic agents.

c. Never functions in the operating room suite without proper supervision of a qualified registered nurse or physician.

d. Never clamps tissues, places sutures, or alters body tissues in any way.

Note: This would be considered performing surgery without a license.

e. Never obtains or administers blood.

f. Never has final sign-off on OR documentation.

Note: The supervising nurse must sign all documentation.

16. Desirable working traits and special demands of the surgical technologist

a. Pay attention to details.

b. Be patient and tactful in dealing with patients and recognize the special needs of medicated patients.

c. Be willing to perform a variety of tasks, some of which may involve unpleasant conditions or people.

d. Be able to work quickly and accurately.

Information Sheet

e. Possess good physical coordination and manual dexterity.

f. Be able to spot flaws or imperfections quickly and accurately.

g. Be able to read with understanding, to reason logically, and to use good judgement.

h. Be able to prioritize.

i. Be able to organize work.

j. Be able to do precision work.

k. Be able to function in a crisis situation.

l. Be able to function under stress.

m. Be adaptable and flexible to change.

n. Be dependable.

o. Be able to communicate effectively.

p. Have respect for the rights, privacy, and property of others.

q. Be able to observe and report.

r. Be able to understand and utilize the necessary equipment.

s. Be able to establish and maintain effective relationships with patient, patient's family, doctors, and staff.

t. Be willing to continue to learn, and to receive education on the new technology entering the health care industry.

17. **Recommended activities to promote professionalism**

a. Understand job functions and responsibilities as listed in job description.

b. Perform job responsibilities in an ethical and professional manner.

c. Become certified and remain current.

d. Participate in professional organizations such as the Association of Surgical Technologists, Inc. (AST).

e. Attend and participate in inservice educational programs.

f. Attend workshops, institutes, and conventions when pertinent to professional growth.

g. Participate in clinical ladder program if implemented by employer.

Professional Responsibilities and Relations
Unit 1-A

Student Supplement 1—Review Duties of Surgical Team Members

Name ______________________________ Date ________________

Directions: Circle the letter of the correct answer.

1. Which of the following team members will first assist the surgeon?

   a. Anesthesiologist
   b. Physician assistant (PA)
   c. OR clinical manager
   d. Circulating room nurse

2. Which one of the following licensed health care workers may NOT perform surgery?

   a. Doctor of Osteopathy (DO)
   b. Oral Surgeon (DDS or DMD)
   c. Certified Registered Nurse Anesthetist (CRNA)
   d. Physician Assistant (PA)

3. Which member of the surgical team below dons sterile apparel?

   a. X-Ray tech
   b. Scrub nurse
   c. Circulator
   d. Patient

4. Which member of the surgical team below performs the surgery?

   a. Physician first assistant
   b. Nonphysician first assistant
   c. Surgeon
   d. Anesthesiologist

5. Which member of the OR team generally functions as the circulator and supervises all nursing activities in the operating room?

   a. OR registered nurse
   b. OR supervisor
   c. Surgical technologist
   d. Surgeon

Student Supplement 1

6. Which member of the OR team below usually cleans, processes, and stores instruments and supplies, performs housekeeping duties, and assists with transportation and positioning of the patients?

   a. Surgical technologist
   b. Surgeon assistant
   c. Nursing assistant/orderly
   d. OR nurse

7. The person directly responsible for everything and everyone in the operating room suite is the

   a. Nursing assistant
   b. Surgical technologist
   c. OR nurse
   d. Director of surgery

8. Which member of the OR team below prepares the sterile field by assembling sterile supplies and equipment?

   a. Nursing assistant
   b. Director of surgery
   c. Circulator
   d. Surgical technologist

9. Which member of the OR team below provides anesthesia to the surgical patient?

   a. CRNA
   b. Surgeon assistant
   c. Surgical technologist
   d. OR nurse

10. Which of the following is an unsterile member of the surgical team?

    a. Surgical technologist
    b. Anesthesiologist
    c. Surgeon
    d. Physician first assistant

Professional Responsibilities and Relations
Unit 1-A

Student Supplement 2—Review Functions of Surgical Technologists and Circulators

Name ______________________________ Date ________________

Directions: Circle T or F to indicate if the statement is true or false.

T F 1. Most work for the surgical technologist is outside the hospital.

T F 2. Surgical technologists never function in the operating room suite without proper supervision of a qualified registered nurse or physician.

T F 3. Every employee's job is important, and each person has a job to perform that fits into the general scheme of the medical facility.

T F 4. A function of the surgical technologist is to anticipate the surgeon's needs by watching the progress of the surgery and by knowing the steps of the procedure involved.

T F 5. Rigid adherence to established procedures is demanded.

T F 6. Hours of duty are subject to the Occupational Safety and Health Act (OSHA).

T F 7. The organizational chart demonstrates the direct and associated lines of authority and is a pattern of control that links together responsibilities within the structure.

T F 8. Only large medical facilities develop organizational charts to show how employees and their departments are related in the whole facility.

T F 9. The surgical technologist assists the surgeon when needed by retracting tissue, cutting sutures, sponging blood and suctioning from the wound, or irrigating the wound.

T F 10. The surgical technologist must go to college to receive training.

T F 11. The surgical technologist commonly chats with the surgeon about personal items during surgery.

T F 12. Surgical technologists commonly help administer anesthetic agents.

T F 13. Only supervisors need to follow the lines of authority when dealing with a problem.

Student Supplement 2

T F 14. The surgical technologist passes instruments, supplies, and equipment to surgeon in a prescribed manner.

T F 15. The surgical technologist may assist in the transportation of patients in and out of the operating room.

T F 16. A responsibility of the surgical technologist is to clamp tissue.

T F 17. The surgical technologist may administer medications.

T F 18. The surgical technologist counts sponges, needles, and the instruments in a prescribed manner at appropriate times before, during, and after surgery with circulator.

T F 19. The surgical technologist keeps equipment in operating condition, and sends for repairs as needed.

T F 20. A job responsibility of the surgical technologist is to keep the family informed.

T F 21. Surgical technologists have no exposure to radiation.

T F 22. Surgical technologists may alter body tissue.

T F 23. A function of the surgical technologist is to assist in ordering and stocking supplies to maintain a current stock.

T F 24. A job responsibility of the surgical technologist is to prepare instruments for decontamination.

T F 25. Surgical technologists may be exposed to cuts, scrapes, bruises, and punctures.

T F 26. A responsibility of the surgical technologist is to connect electrical equipment to power sources during surgery.

T F 27. A function of the surgical technologist is to identify and preserve specimens received during surgery in a prescribed manner.

T F 28. All people in the hospital function in direct relationship with the patient.

Student Supplement 2

T F 29. The circulator counts sponges, needles, and instruments in prescribed manner at appropriate times before, during, and after surgery with scrub, and documents these counts.

T F 30. The circulator checks and connects electrical equipment to power sources.

T F 31. The circulator empties trash containers during surgery.

T F 32. The circulator handles only sterile equipment in the room during surgery.

T F 33. The circulator greets and properly identifies the patient.

T F 34. The circulator performs the surgical prep and possibly the shave prep of the patient.

T F 35. The circulator anticipates the needs of the scrubbed team.

Professional Responsibilities and Relations
Unit 1-A

Assignment Sheet 1—Draw an Organizational Chart

Name ______________________ Overall Rating __________

Evaluation criteria	**Rating**
Chart is accurate for local medical facility	_____
Chart is neat and legible	_____

Directions: Draw an organizational chart of the OR suite for a local hospital or medical facility. It would be helpful to you if you would choose one where you expect to be working as a surgical technologist. Contact the facility for this information or check with your instructor. Refer to the Information Sheet, Objective 6, for an example.

Professional Responsibilities and Relations
Unit 1-A

Assignment Sheet 2—Distinguish Among Duties of the Surgical Team Members

Name ______________________________ Overall Rating __________

Evaluation criterion	**Rating**
Answers are correct	______

Directions: Distinguish among the duties of the surgical team members by placing the following letters next to the correct descriptions:

"S" for surgeon
"A" for anesthesia person
"C" for circulator
"SP" for scrub person

Some duties may be performed by more than one team member.

______ 1. Assists anesthesia person when needed.

______ 2. Counts sponges, needles, and instruments in prescribed manner at appropriate times before, during, and after surgery.

______ 3. Anticipates the needs of the scrubbed team.

______ 4. Completes operative records.

______ 5. Assists surgeon when needed by retracting tissue, cutting sutures, sponging and suctioning blood from the wound, or irrigating the wound.

______ 6. Is ultimately responsible for the care of specimens received from the scrub.

______ 7. Prepares instruments and supplies for decontamination.

______ 8. Performs the surgery.

______ 9. Administers medications.

______10. Performs the scrub prep and possibly the shave prep of the patient.

______11. Anticipates the surgeon's needs by watching the progress of the surgery.

______12. Handles all nonsterile equipment in the room during surgery.

Assignment Sheet 2

_______13. Assists in transporting patient before and after surgery.

_______14. Identifies and cares for specimens received during surgery in prescribed manner, and passes to circulator.

_______15. Primarily administers anesthetic agents.

_______16. Decontaminates floor or equipment promptly during operation if contaminated by blood or body fluids.

_______17. Practices Universal Precautions by wearing gloves any time contact with body fluids is anticipated.

_______18. Tapes post-operative dressing.

_______19. Disposes of all sharps in proper waste receptacle.

_______20. May accompany patient to Post-Anesthesia Room to give a nursing report of patient's progress and condition.

_______21. Checks supplies and equipment needed for surgical procedure.

_______22. Dons sterile gown and gloves.

_______23. Gowns and gloves the surgeon and assistants as soon as they enter the room.

_______24. Assists in draping the patient with sterile drapes.

_______25. Attaches suction tubing and electrosurgical cords to the sterile field.

_______26. Passes sterile instruments, supplies, equipment, and sutures to surgeon.

_______27. Obtains and prepares all medications needed during the procedure.

_______28. Sees that patient is clean after surgery.

_______29. Performs proper clean up of equipment and supplies.

_______30. Performs surgical hand wash.

_______31. Keeps equipment in operating condition, and sends for repairs as needed.

_______32. Checks and connects electrical equipment to power sources, and connects suction to vacuum.

_______33. Ties gowns of sterile team members.

Assignment Sheet 2

______34. Handles all nonsterile equipment in the room during surgery.

______35. Keeps discarded sponges collected.

______36. Obtains blood products for transfusion as directed

______37. Maintains an orderly surgical field.

______38. After receiving medication onto the sterile field from the registered nurse, prepares and passes medications to surgeon.

______39. Observes for any breaks in aseptic technique.

______40. Prepares sterile field by assembling supplies and equipment.

Interpersonal Relationships and Communication Skills
Unit 2-A

Objective Sheet

Unit Objective

After completing this unit, the student should be able to discuss and apply effective interpersonal relationship and communication skills as they relate to surgical technology. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to interpersonal relationships with their correct definitions.
2. Distinguish between types of relationships.
3. Select factors needed for good relationships.
4. Arrange in order Maslow's hierarchy of human needs.
5. Match terms related to communication skills with their correct definitions.
6. List goals of communication.
7. Match types of communication with the correct descriptions.
8. State four components of communication.
9. Select true statements concerning effective listening skills.
10. Describe effective speaking skills.
11. List rules for communicating on the telephone.
12. Select forms of communication written by surgical technologists.
13. Distinguish between positive and negative body language signals.
14. Select true statements concerning the importance of effective communication for the patient undergoing surgery.
15. Match techniques for therapeutic communication with their correct examples.

Objective Sheet

16. Match blocks to therapeutic communication with their correct examples.
17. Select communication requirements while in surgery.
18. Evaluate your interpersonal relationship skills. (Assignment Sheet 1)
19. Evaluate your listening skills. (Assignment Sheet 2)
20. Apply effective communication skills to given situations. (Assignment Sheet 3)
21. Evaluate therapeutic communication skills in given situations. (Assignment Sheet 4)

Interpersonal Relationships and Communication Skills
Unit 2-A

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Types of Relationships (Objective 2)
   TM 2—Maslow's Hierarchy of Needs (Objective 4)
   TM 3—Components of Communication (Objective 8)
   TM 4—Body Language Signals (Objective 13)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of the Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Suggested Activities

Evaluation

12. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

13. Make copies of the written test. Add or modify test items as needed.

14. Give written test.

15. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

16. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Demonstrate the components of communications. Cut out three shapes from poster board, three sizes per shape. You will need one set of shapes per student. Divide students into pairs. One student is to be the engineer and one the builder. Arrange student desks back to back. The engineer creates a design. The next task for the engineer is to communicate to the builders how to recreate the design without using the following. size, shape, or color (if colored) of the designs. The builders can only say "ok" or "repeat." You will need to put a time limit on each part of the exercise. When builders are finished, have them turn around and compare their creation with the original. Have the students switch roles. Discuss factors involved. This reinforces the unit content and **communication, adaptability**, and **group effectiveness skills**.

2. To reinforce **listening skills**, read a piece of written communication to the class, and then ask them specific questions about the communication message. The piece to be read could be a short article from a newspaper or magazine, one page from a novel, a resumé, or a work related report or record. Students should not be allowed to take notes while you read. This will help students test their listening and memory skills.

3. Contact your local telephone companies and request handouts and/or demonstrations of telephone etiquette. Then discuss the handouts or demonstrations. This reinforces the unit content and **communication skills**.

4. Collect forms from your local surgery departments and have students practice filling them out. This reinforces **foundation reading and writing skills**.

Suggested Activities

5. Divide the class into groups of three or four and have them write a brief situation involving difficult communication situations. Have each group present their situation and conduct a two minute discussion of effective methods to handle the situations.

6. Invite a panel with members of different ethnic backgrounds to discuss cultural influences on communication and health care practices. This reinforces the unit content through **communication and group effectiveness skills**.

7. Have students give oral and written reports on interpersonal relationships or communication topics. This reinforces **foundation reading and writing, communication**, and **personal management skills**.

8. Demonstrate observation skills. With students in pairs, have them stand and face each other for five seconds and observe each other. Then turning back to back one student takes ten seconds to make three changes in his/her appearance. For example, they could remove a ring, unbutton an button, and roll up a sleeve. They then turn face to face and the observer has five seconds to tell the other person what changes were made. Let students trade places. This reinforces **group effectiveness** and **adaptability skills**.

9. Demonstrate nonverbal communication skills. Divide the class into groups of three to five students per group. Pass out 3×5 cards with nonverbal communications listed. Give each group different nonverbal communications. Use both positive and negative. Each group presents their signals while the rest of the group writes down what they think the nonverbal communication is and if it is positive or negative. This reinforces **adaptability** and **group effectiveness skills**.

10. Have student break into groups and discuss their answers to the assignment sheets prior to or instead of grading assignment sheets. This reinforces **communication, personal management**, and **group effectiveness skills**.

Resources Used in Developing This Unit

1. Atkinson, Lucy. *Berry & Kohn's Operating Room*, 7th ed. St. Louis: C. V. Mosby Co., 1992.

2. Ellis, David. *Becoming a Master Student*, 6th ed. Rapid City, SD: College Survival Inc., 1991.

3. Meeker, Margaret and Jane Rothrock. *Alexander's Care of the Patient in Surgery*, 9th ed. St. Louis: C. V. Mosby Co., 1991.

Suggested Activities

Suggested Supplemental Resources

1. *Successful Living Skills* series.

    a. *Successful Human Relations*

    b. *Effective Communication*

    c. *Effective Social Skills*

    These three modules in the series are available in teacher and student books from:

    Curriculum and Instructional Materials Center (CIMC)
    1500 West Seventh Avenue
    Stillwater, OK 74074-4364
    800-654-4502 or 405-743-5589

2. *Applied Communication* series. Consists of fifteen teaching modules and videotapes. The following modules are especially appropriate for this unit:

    a. *Communicating in the Workplace*

    b. *Communicating with Co-Workers*

    c. *Communicating with Supervisors*

    d. *Presenting Your Point of View*

    e. *Communicating to Solve Interpersonal Conflicts*

    f. *Evaluating Performance*

    These modules and videotapes are available from:

    Agency for Instructional Technology (AIT)
    Box A
    Bloomington, IN 47402-0120
    800-457-4509 or 812-339-2203

3. Banks, James A. *Teaching Strategies for Ethnic Studies*, 5th ed. Boston: Allyn and Bacon Inc., 1991.

Suggested Activities

4. Software

   a. *Effective Staff Communications*

   b. *Therapeutic Patient Communications I*

   c. *Therapeutic Patient Communications II*

   All of 4 are available from:

   Computerized Educational Systems
   307 Park Lake Circle
   P.O. Box 536905
   Orlando, FL 32853-6905

5. *For Patient's Sake.* Videotape available from:

   AORN
   10170 East Mississippi Avenue
   Denver, CO 80231
   303-755-6300

6. *Three Techniques in the Art of Communication.* 1989, 15 minute videotape shows productive communication in role-play situations. Available from:

   Cine-Med Distribution Center
   Davis + Geck Video Library
   P.O. Box 745
   Woodbury, CT 06898
   800-633-0004

7. *Communication That Works: Health Professionals and People with Disabilities.* 15 minute videotape.

8. *Patients . . . Are People Too.* 1986, 14 minute videotape.

9. *Listening and Responding Skills.* 1985, 15 minute videotape.

   7 - 9 are available from:

   Health Sciences Consortium
   201 Silver Cedar Court
   Chapel Hill, NC 27514-1517
   919-942-8731

Suggested Activities

10. *I Only Hear You When I See Your Face.* 10 minute videotape discussing ways to communicate with hearing-impaired patient.

11. *Communicating Therapeutically.* Videotape explaining how illness can affect a patient psychologically and techniques for overcoming communication barriers.

12. *Did You Get My Message?* 16 minute videotape emphasizing the importance of sending clear messages in a health care setting.

13. *Active Listening.* 18 minute videotape teaching the skills and barriers to active listening.

    10 - 13 are available from:

    Insight Media
    121 West 85th Street
    New York, NY 10024
    800-233-9910 or 212-721-6316

14. *Communications: The Process.* 1987, 25 minute videotape explores effective speaking and listening skills in today's health care facility.

15. *Communications: Peer Relationships.* 1987, 18 minute videotape describes how to improve professional working relationships with co-workers and patients.

    14 and 15 are available from:

    Medcom/Trainex
    P.O. Box 3225
    Garden Grove, CA 92641
    800-877-1443 or 714-891-1443

Interpersonal Relationships and Communication Skills
Unit 2-A

Answers to Assignment Sheets

Assignment Sheet 1—Evaluated according to the stated criteria. "No" answers indicate problems that should be discussed in the "Suggestions for Improvement" section.

Assignment Sheet 2—Evaluated according to the stated criteria. "Often" and "Sometimes" indicate poor listening skills.

Assignment Sheet 3

Note: Answers to discussion questions will vary.

Situation 1

1. The purpose of the assignment is to present information including the rationale and technique of open gloving.
2. Answer should include assessing the material to be presented and the audience. Also may include planning visual support for the lecture and the mechanics of voice tone.
3. Any three of the following: be sincere and be aware of voice tone, fluency, articulation, and nonverbal communications.
4. No specific answer is given in the unit information. Answers may include: give a demonstration, use visual aids, etc.
5. Answer should include at least one of the following: listening for feedback, asking questions of the audience, asking for repeat demonstrations by members of the group, etc.
6. No specific answers are provided in the text except listening and evaluation of feedback.

Situation 2

1. The major goal of the assigned task is to solve the problem of which piece of equipment will be purchased.
2. a. Positive communication being demonstrated include smiling and relaxed tone between two of the surgeons.
   b. Negative communication is being demonstrated by the isolated surgeon with crossed legs and folded arms.
3. Any two of the following: finger tapping, cracking knuckles, wringing hands, tugging hair, moving around in chair if seated, clenching fist, folding arms, raising eyebrows, scowling, tightly pressed lips, shaking head from side to side, etc.

Answers to Assignment Sheets

Assignment Sheet 4

1. a. Answer should include one of the following: Nature of the disease, possible disfigurement, possible prognosis.
   b. Answer should relate to factor identified by the student and include one of the following: Asking open ended questions, stating observations, giving information, validating, using silence, accepting, paraphrasing, and summarizing.
2. a. Security level (emotionally needs to know that family is ok).
   b. Same answers as 1b.
3. State observations, provide for patient needs (without overstepping care giver's responsibilities), and validate that the needs are met.
4. Lower level — Physiological (Basic needs must be constantly assessed and met by the operating team.)
5. NA. You should address the patient, not his father.
6. A. Using broad opening statements
7. NA. Reassuring clichés block communication and do not address the patient's anger and fears.
8. A. Using validating technique
9. NA. "Why" questions can intimidate and may seem accusatory. Rephrase like "I see you're shaking. Is there something I can do for you?"
10. Any two of the following: (Other answers are possible.)

    a. Any direct communication with the patient will need to be on the child's level, both the physical level and the intellectual level. Use simple words and avoid "trigger" words that could scare the child such as "shots, needles, medicine, cut you, stick you," etc.

    b. Because of the patient's age and the situation, the child will probably either not be able to or not want to talk to you. Therefore, verbal communication will primarily occur between you and the mother, and then between the mother and the child.

    c. Nonverbal communication will be an important way to communicate with the young patient. Reassuring smiles and nods will help make the patient feel more comfortable.

    d. The mother's apprehension about the surgery will be felt by the patient. If you address the mother's fears and questions, you will reassure her, which in turn will reassure the patient. The patient will calm down as the mother calms down.

11. A. Reduces language barrier; reassures patient
12. A. Reassures patient; makes them feel protected
13. NA. Patient probably does not understand for various reasons, such as hearing impairment, language barrier, mental illness, or influence of medications. Care giver needs to ask other questions that require a different answer to see how much the patient hears or understands.

Answers to Assignment Sheets

14. NA. Many patients have a difficult time expressing themselves. Care giver should use general leads to help get them started or mention questions that other patients having similar procedures have asked to see if they will trigger any questions they might have.
15. Ask the surgeon to briefly explain what you have done or not done correctly. If it needs to be handled immediately, apologize and correct the work. If you do not agree that you have done something wrong, or if it can be corrected later, tell the surgeon you will be glad to discuss the problem after surgery is finished. 'You can't learn from your mistakes or do your job if you leave.

Interpersonal Relationships and Communication Skills
Unit 2-A

Answers to Written Test

1.

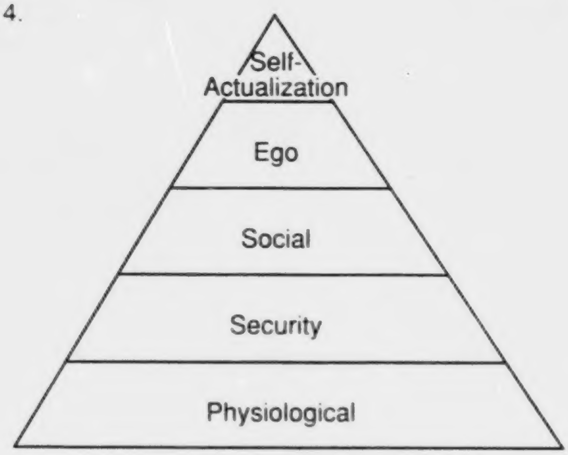
a.	10	f.	5	j.	14
b.	4	g.	11	k.	7
c.	16	h.	12	l.	8
d.	2	i.	9	m.	1
e.	3				

2.

a.	S	f.	S	j.	P
b.	P or T	g.	P or T	k.	T
c.	S	h.	S	l.	S
d.	P	i.	T	m.	P
e.	T				

3. b, c, f, g

4.


Self-
Actualization
Ego
Social
Security
Physiological

5.

a.	2	e.	9	i.	10
b.	6	f.	8	j.	5
c.	12	g.	4	k.	7
d.	13	h.	11	l.	1

Answers to Written Test

6. Any three of the following:

   a. To give information to others
   b. To obtain information from others
   c. To express feelings
   d. To solve problems through communication
   e. To persuade others to change an attitude or behavior

7. a. 2
   b. 4
   c. 3
   d. 1

8. a. Sender (encoder)
   b. Message
   c. Receiver (decoder)
   d. Feedback

9. a. F Eye contact without staring shows focus and is a desirable listening skill.
   b. T
   c. T
   d. F Sensitivity refers to being positive in one's approach to giving the speaker feedback.

10. Any three of the following:

    a. Assess — Determine purpose and audience.
    b. Plan — Determine what to say and how.
    c. Present — Be sincere. Be aware of voice tone, fluency, articulation, and nonverbal communications.
    d. Listen — To feedback and look for nonverbal clues from the audience.
    e. Evaluate — Use feedback to see if the correct message was received.

11. Any four of the following:

    a. Be courteous.
    b. Speak clearly and distinctly.
    c. Ask other person to speak more loudly or repeat information if you can not hear well.
    d. Identify yourself.
    e. Identify other party if they did not identify themselves.
    f. Record all information clearly and accurately.
    g. Make a note of the time of the call.
    h. Verify all information that you have recorded. Repeat what you have written.
    i. Only licensed personnel can record doctor's orders.

Answers to Written Test

12. b. c. d. e

13.

a.	P	e.	N	i.	P
b.	N	f.	N	j.	N
c.	N	g.	P	k.	N
d.	P	h.	P	l.	N

14.
- a. T
- b. F—Patients under the stress and anxiety of the upcoming surgery have a deep need to communicate their feelings and their emotional and physical needs to the health care team.
- c. F—Patients indicate their needs by what they say and by what they do not say.
- d. T

15.

a.	6	e.	4
b.	5	f.	9
c.	2	g.	10
d.	1		

16.

a.	3	d.	8
b.	1	e.	7
c.	2	f.	5

17. a, c

Interpersonal Relationships and Communication Skills
Unit 2-A

Written Test

Name ______________________________ Score ______________

1. Match terms related to interpersonal relationships on the right the correct definitions.

______a. Confidence and satisfaction in oneself

______b. Emotion marked by dread, apprehension, and alarm

______c. Principle or quality that is appreciated and highly rated by a particular person or group

______d. Observable response of an individual to the environment

______e. Customary beliefs, social forms, and material traits of a racial, religious, or social group

______f. Association between persons

______g. Mental concept one has of oneself

______h. Community, nation, or broad grouping of people having common traditions, institutions, and collective activities and interests

______i. Study of the mind and behavior

______j. Physical, chemical, or emotional factor that causes bodily or mental tension

______k. One that belongs to the same group in society, primarily determined by age, grade, or status

______l. Complex of character traits, attitudes, behaviors, and emotional tendencies that distinguish an individual from others

______m. Mental position, feeling, or emotion toward a fact or state

1. Attitude
2. Behavior
3. Culture
4. Fear
5. Interpersonal relationship
6. Need
7. Peer
8. Personality
9. Psychology
10. Self-esteem
11. Self-image
12. Society
13. Sociology
14. Stress
15. Teamwork
16. Value

Written Test

2. Distinguish between types of relationships by placing the following letters next to the correct descriptions or characteristics: "S" for social, "P" for professional, and "T" for therapeutic.

______a. Behavior limited by social protocol, but feelings, ideas, and actions are expected to be shared and respected.

______b. **Not** a mutual relationship

______c. Mutual relationship

______d. Limited to conduct under job description

______e. Between patient and health care team members

______f. May be casual or intimate, brief or longlasting

______g. Goal directed

______h. **Not** goal directed

______i. Relationship lasts as long as needed to perform service to patient

______j. Between co-workers of a profession

______k. Involves the care and treatment of the patient by the health care team

______l. Between peers

______m. Behavior is guided by ethical code and policies of institution, along with common courtesy and good manners.

3. Select from the following list those factors needed for good relationships by placing an "X" in the appropriate blanks.

______a. Open expression of feelings

______b. Recognizing and meeting your needs

______c. Recognizing and meeting the other person's needs

______d. Similar interests and hobbies

______e. Love

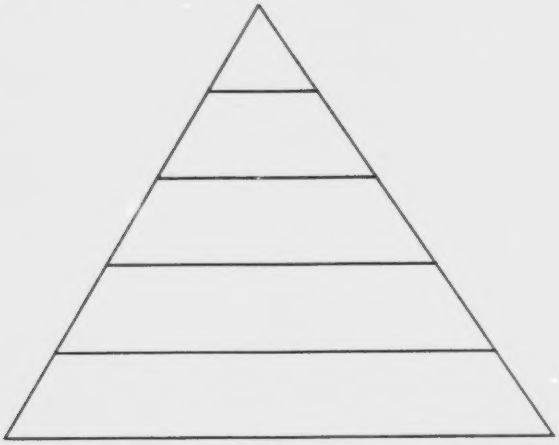
______f. Effective communication

______g. Behaving in the correct manner at the correct times

______h. Financial rewards

Written Test

4. Arrange in order Maslow's hierarchy of human needs by placing the following needs in their correct order in the pyramid shown: Ego, physiological, security, self-actualization, and social.



5. Match terms related to communication skills on the right with the correct definitions.

_____a. Gestures, mannerisms, body movements, bearing, and physical appearance of an individual which communicates information and attitudes to the receiver

_____b. Putting one's self in another person's position; participating in another person's feelings or ideas

_____c. Receiving, processing, and evaluating sounds

_____d. Series of actions or operations

_____e. Personal, subjective responses to a person or situation

_____f. Returning information to the source after an action or process, primarily to evaluate or correct the source

1. Articulating
2. Body language
3. Climate
4. Communication
5. Decoding
6. Empathy
7. Encoding
8. Feedback
9. Feelings
10. Fluency

Written Test

______g. Process by which information is exchanged between individuals through a common system of symbols, signs, or behavior

______h. Physiologic process of receiving sounds

______i. Smooth, effortless, polished speaking

______j. Receiving a message and translating it

______k. Putting thoughts into words

______l. Speaking clearly and distinctly

11. Hearing
12. Listening
13. Process

6. List three goals of communication.

a. ______________________________

b. ______________________________

c. ______________________________

7. Match types of communication on the right with the correct descriptions.

______a. Communication sent in ways other than by words; depends on the five basic senses

______b. Communication in which words are written; depends on the abilities to write, read, and see

______c. Communication in which words are spoken aloud; depends on the abilities to speak and hear

______d. Communication using words

1. Verbal
2. Nonverbal
3. Oral
4. Written

8. State the four components of communication.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

Written Test

9. Read the following statements concerning effective listening skills. Place a "T" or "F" next to the true and false statements. If the statement is false, rewrite the statement to make it true on the line provided below the statement.

Example: _F_ Good listening is unnecessary for effective communications.
Good listening is essential to effective communications.

______a. Eye contact by staring shows focus and is a desirable listening skill.

____

____

____

______b. Attention is shown by displaying openness using positive nonverbal communications and not interrupting.

____

____

____

______c. Receptiveness means that one is open minded toward the speaker or the message.

____

____

____

______d. Sensitivity refers to being frank in one's approach to giving the speaker feedback.

____

____

____

Written Test

10. Describe three effective speaking skills.

a. ____

____

b. ____

____

c. ____

____

11. List four rules for communicating on the telephone.

a. ____

____

b. ____

____

c. ____

____

d. ____

____

12. Select from the following list the forms of communication written by surgical technologists by placing an "X" in the appropriate blanks.

______a. Prescriptions for medications

______b. Patient records

______c. Supply requests

______d. Personal resumes

______e. Count records

Written Test

13. Distinguish between positive and negative body language signals by placing a "P" next to the positive signals and an "N" next to the negative signals.

______a. Head nodding up and down

______b. Arms folded tightly high on chest

______c. Moving around in chair

______d. Smiling

______e. Tapping fingers, cracking knuckles, wringing hands

______f. Clenched fist

______g. Open stance (arms unfolded, legs uncrossed)

______h. Sitting slightly forward in chair

______i. Eye contact

______j. Lips pressed tightly

______k. Scowl or frown

______l. Turning head from side to side

14. Read the following statements concerning the importance of effective communication for the patient undergoing surgery. Place a "T" or "F" next to the true and false statements. If the statement is false, rewrite the statement to make it true on the line provided below the statement.

______a. Communication is the basis for the continuum of patient care and teamwork among the staff.

____

____

______b. Patients under the stress and anxiety of the upcoming surgery have no need to communicate their feelings or their emotional and physical needs to the health care team.

____

____

Written Test

______c. Patients only indicate their needs by what they say.

______d. Effective communication can influence the patient's attitude toward surgery and health care workers.

15. Match techniques for therapeutic communication on the right with their correct examples.

______a. Patient: "I hate waiting here. I'm so frustrated."
Care giver: "You are frustrated with waiting."

______b. Patient: "I hate waiting here."
Care giver: "Yes, it must be frustrating for you."

______c. "Yes . . . Oh? . . . Go on . . . "

______d. "Is there something bothering you?"

______e. "You're trembling. You seem upset. Am I wrong?"

______f. "I'm not sure I understand. Are you saying that . . . ?"

______g. Care giver: "Are you feeling better?"
Patient: "Yes."
Care giver: "Is there anything else I can do for you?"
Patient: "No. I'm better now."

1. Using broad opening statements
2. Using general leads
3. Giving information to the patient
4. Sharing observations with patient
5. Acknowledging the patient's feelings
6. Reflecting (paraphrasing)
7. Selective reflecting
8. Using silence
9. Clarifying
10. Validating

Written Test

16. Match blocks to therapeutic communication on the right with their correct examples.

______a. "Yes, that's good. I agree with you."

______b. "Everything will be ok. Don't worry, be happy."

______c. "What you should do is . . . "

______d. Patient: "I wish I could just die."
Care giver: "How did you sleep last night?"

______e. Patient: "I don't like this old hospital."
Care giver: "This is **not** an old hospital. We have the most up-to-date equipment that you could find anywhere in this state."

______f. Patient: "I wish I could just die."
Care giver: "Everyone feels that way."

1. Using clichés
2. Giving advice
3. Giving approval or agreement
4. Requesting an explanation
5. Belittling the patient's feelings
6. Expressing disapproval or disagreement with the patient
7. Defending
8. Changing the subject

17. Select from the following list the correct communication requirements while in surgery by placing an "X" in the appropriate blanks.

______a. Listen carefully and speak clearly while wearing an operating room mask.

______b. Communicate professionally by using slang terms.

______c. Follow verbal directions quickly and correctly.

______d. Do not use nonverbal communication.

***Permission to duplicate this test is granted.**

Interpersonal Relationships and Communication Skills
Unit 2-A

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Evaluate Your Interpersonal Relationship Skills Rating _____

Comments: ____

____

Assignment Sheet 2—Evaluate Your Listening Skills Rating _____

Comments: ____

____

Assignment Sheet 3—Apply Effective Communication Skills to Given Situations Rating _____

Comments: ____

____

Assignment Sheet 4—Evaluate Therapeutic Communication Skills in Given Situations Rating _____

Comments: ____

____

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ____

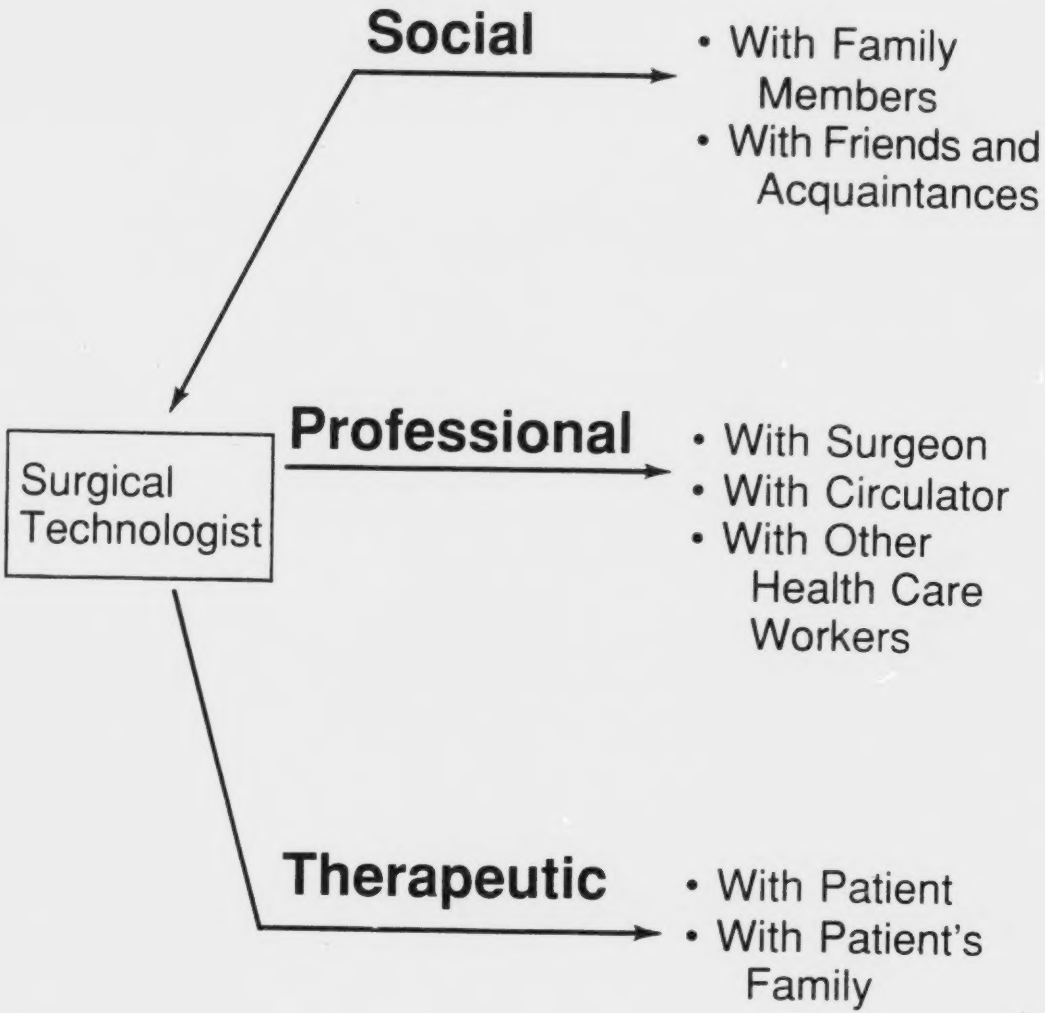
____

Teacher Signature ______________________________ Date __________

Student Signature ______________________________ Date __________

***Permission to duplicate this form is granted.**

Types of Relationships



Surgical Technologist

Social

- With Family Members
- With Friends and Acquaintances

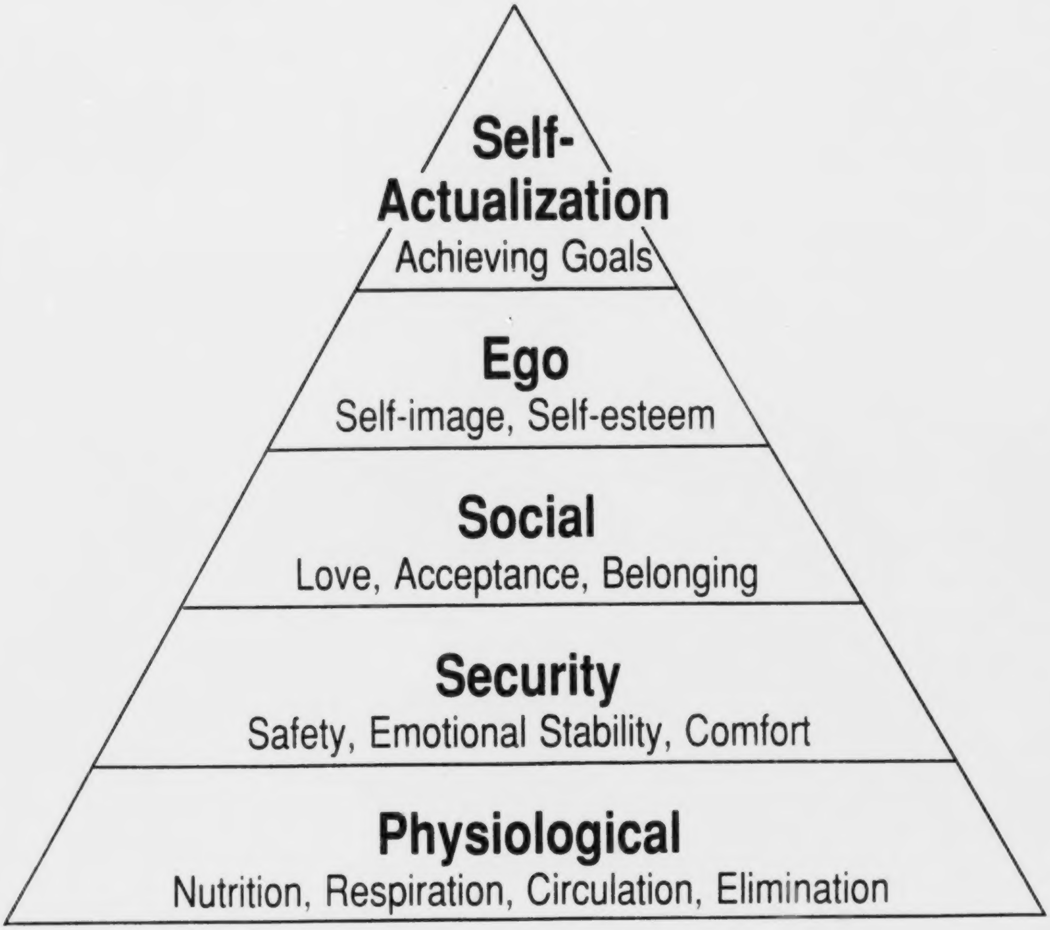
Professional

- With Surgeon
- With Circulator
- With Other Health Care Workers

Therapeutic

- With Patient
- With Patient's Family

Maslow's Hierarchy of Needs



Self-Actualization
Achieving Goals

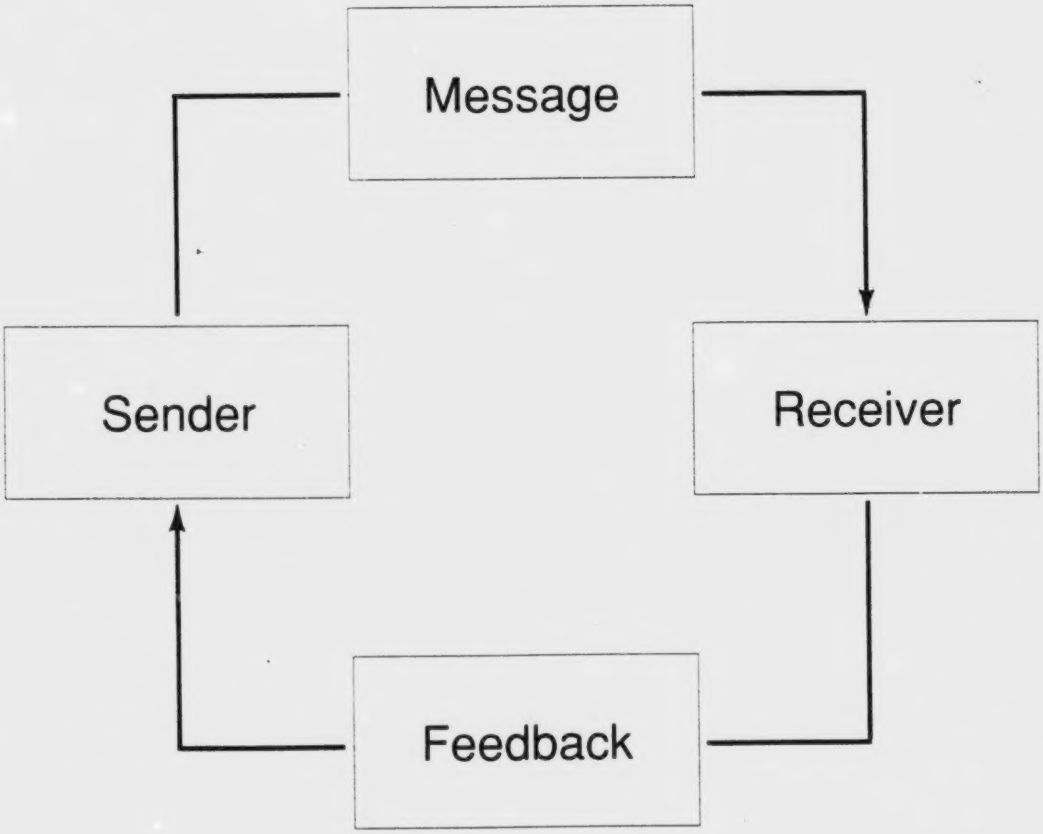
Ego
Self-image, Self-esteem

Social
Love, Acceptance, Belonging

Security
Safety, Emotional Stability, Comfort

Physiological
Nutrition, Respiration, Circulation, Elimination

Components of Communication



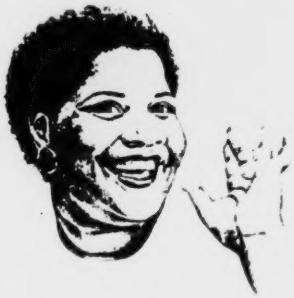
Message

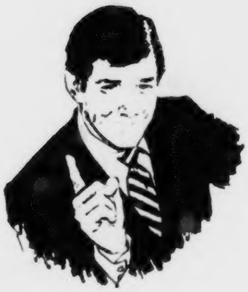
Receiver

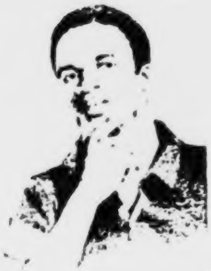
Feedback

Sender

Body Language Signals

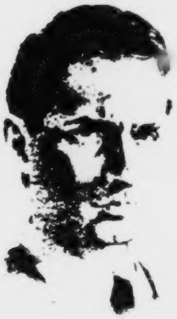


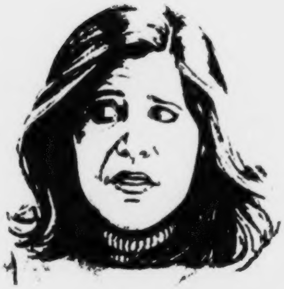


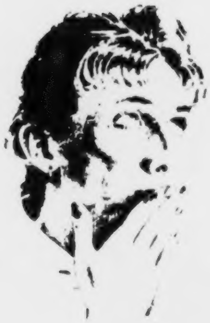


Positive

Negative







Interpersonal Relationships and Communication Skills
Unit 2-A

Information Sheet

1. **Terms and definitions related to interpersonal relationships**

    a. **Attitude** — Mental position, feeling, or emotion toward a fact or state

    b. **Behavior** — Observable response of an individual to the environment

    c. **Culture** — Customary beliefs, social forms, and material traits of a racial, religious, or social group

    d. **Fear** — Emotion marked by dread, apprehension, and alarm

    e. **Interpersonal relationship** — Association between persons

    f. **Need** — Physiological or psychological requirement for the well-being of an organism

    g. **Peer** — One that belongs to the same group in society, primarily determined by age, grade, or status

    h. **Personality** — Complex of character traits, attitudes, behaviors, and emotional tendencies that distinguish an individual from others

    i. **Psychology** — Study of the mind and behavior

    j. **Psychosocial** — Concerning the influence of society on mental processes and behavior

    Example: How social conditions affect mental health

    k. **Self-esteem** — Confidence and satisfaction in oneself

    l. **Self-image** — Mental concept one has of oneself

    m. **Society** — Community, nation, or broad grouping of people having common traditions, institutions, and collective activities and interests

    n. **Sociology** — Study of society, social institutions, and social relationships

    o. **Stress** — Physical, chemical, or emotional factor that causes bodily or mental tension

Information Sheet

p. **Teamwork** — Work done by several people (team members), each doing a part for the efficiency of the whole

q. **Value** — Principle or quality that is appreciated and highly rated by a particular person or group

2. **Types of relationships**

a. Social

(1) Between peers

(2) Mutual relationship (involves sharing, give-and-take)

(3) **Not** goal directed

(4) May be casual or intimate, brief or longlasting

(5) Behavior limited by social protocol, but feelings, ideas, and actions are expected to be shared and respected.

b. Professional

(1) Between co-workers of a profession

(2) **Not** a mutual relationship

(3) Goal directed

(4) Limited to conduct under job description

(5) Behavior is guided by ethical code and policies of institution, along with common courtesy and good manners.

Note: Individuals having this type of relationship do **not** overstep their positions.

c. Therapeutic

(1) Between health care team members and the patient and the patient's family

(2) **Not** a mutual relationship

(3) Goal directed

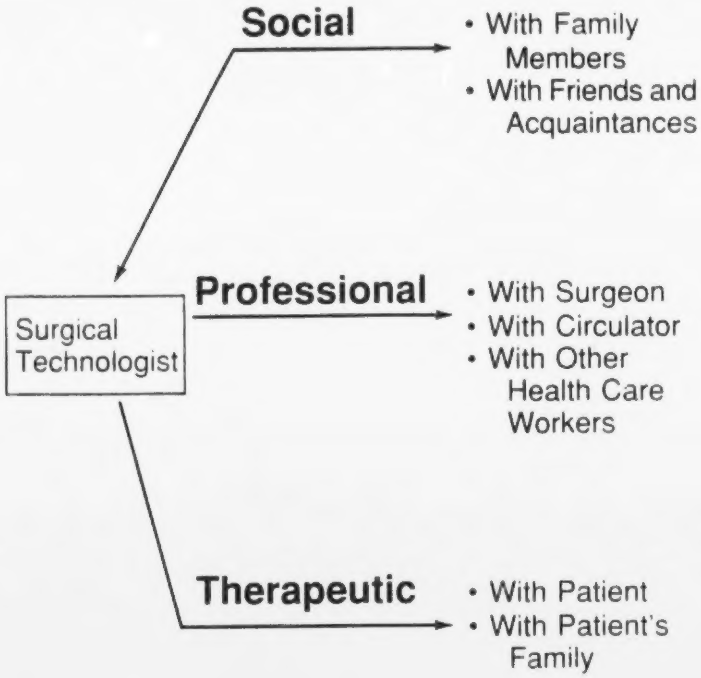
(4) Involves the care and treatment of the patient by the health care team

Information Sheet

(5) Relationship lasts as long as needed to perform service to patient

(6) The patient's trust and confidentiality must be respected.

Figure 1—Types of relationships involving the surgical technologist


Social
• With Family Members
• With Friends and Acquaintances
Surgical Technologist
Professional
• With Surgeon
• With Circulator
• With Other Health Care Workers
Therapeutic
• With Patient
• With Patient's Family

3. Factors needed for good relationships

a. Effective communication

b. Recognizing and meeting your needs

c. Recognizing and meeting the other person's needs

d. Behaving in the correct manner at the correct times

  (1) Recognizing the type of relationship that exists

  (2) Reacting appropriately within that relationship

Information Sheet

4. Maslow's hierarchy of human needs

Note: Psychologist Abraham Maslow identified the following as needs common to all. Based on a hierarchy of priority, the lower (more basic) needs must be met before an individual can move to the next level. These needs are stated here from lowest to highest. Refer to Figure 2 for a pyramid representation.

a. **Physiological need** — Most basic and dominant; includes need for food, fluid, oxygen, physical activity, rest, elimination, and sexual satisfaction

b. **Security need** — Includes feeling safe, emotionally secure, and comfortable

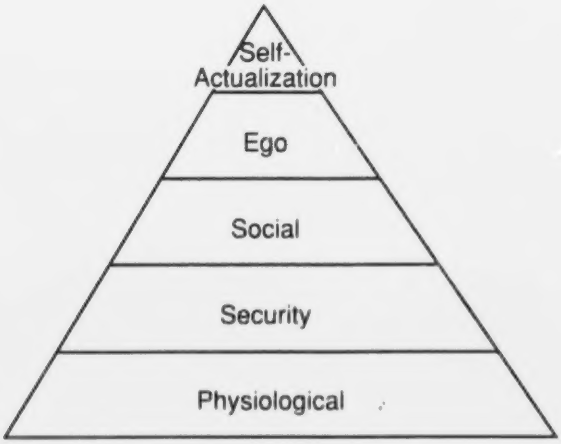
c. **Social need** — Includes affection, love, acceptance, kindness, belonging, intimacy, and friendship

d. **Ego need** — Includes approval, recognition, prestige, and status from others because of an individual's actions; elevates self-esteem, confidence, and self-image

e. **Self-actualization** — The ultimate in personal achievement; achievement in reaching goals of direction, identity, realization, and fulfillment

Note: In some individuals the need for self-actualization may never be satisfied, or it may be satisfied only for brief "quality" moments.

Figure 2—Maslow's hierarchy of human needs



Information Sheet

5. **Terms and definitions related to communication skills**

   a. **Articulating** — Speaking clearly and distinctly

   b. **Body language** — Gestures, mannerisms, body movements, bearing, and physical appearance of an individual which communicate information and attitudes to the receiver

   c. **Climate** — Environmental conditions such as location, timing, and atmosphere that influence the effectiveness of communication

   d. **Communication** — Process by which information is exchanged between individuals through a common system of symbols, signs, or behavior

   e. **Decoding** — Receiving a message and translating it

   f. **Empathy** — Putting one's self in another person's position; participating in another person's feelings or ideas

   g. **Encoding** — Putting thoughts into words

   h. **Feedback** — Returning information to the source after an action or process, primarily to evaluate or correct the source

   i. **Feelings** — Personal, subjective responses to a person or situation

      Examples: Sadness, joy, love, anxiety, anger, respect

   j. **Fluency** — Smooth, effortless, polished speaking

   k. **Hearing** — Physiologic process of receiving sounds

   l. **Listening** — Receiving, processing, and evaluating sounds

   m. **Process** — Series of actions or operations

6. **Goals of communication**

   a. To give information to others

   b. To obtain information from others

   c. To express feelings

   d. To solve problems through communication

   e. To persuade others to change an attitude or behavior

Information Sheet

7. Types of communication

a. Verbal — Communication using words

(1) Oral — Words are spoken aloud; depends on the abilities to speak and hear

Examples: Conversations, speeches, telephone messages

(2) Written — Words are written; depends on the abilities to write, read, and see

Examples: Books, memos, letters, fax messages, electronic mail, patient records, order forms

b. Nonverbal — Communication sent in ways other than by words; depends on the five basic senses

Examples: Colors, smells, tastes, feelings of hot or cold, body language signals, crying, moaning, music (without lyrics), art, bar codes to be read by computers, traffic signs, medical symbols

8. Components of communication

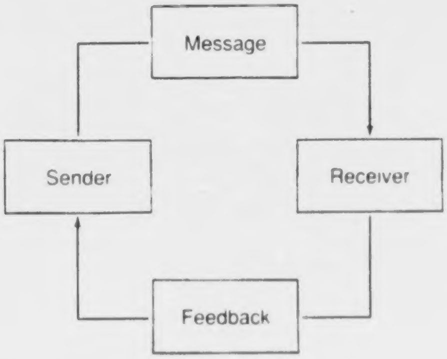
a. Sender (encoder)

b. Message

c. Receiver (decoder)

d. Feedback

Figure 3—Components of communication



Information Sheet

9. **Effective listening skills**

   a. **Eye contact** — Focus on the speaker, but avoid staring.

   Note: Some cultures are uncomfortable with sustained eye contact.

   b. **Attention** — Display openness using positive nonverbal communication, and do not interrupt.

   c. **Receptiveness** — Be open-minded and objective.

   d. **Sensitivity** — Respond positively when giving feedback.

10. **Effective speaking skills**

    a. **Assess** — Determine purpose and audience.

    b. **Plan** — Determine what to say and how.

    c. **Present** — Be sincere. Be aware of voice tone, fluency, articulation, and nonverbal communications.

    d. **Listen** — To feedback and look for nonverbal clues from the audience.

    e. **Evaluate** — Use feedback to see if the correct message was received.

11. **Rules for communicating on the telephone (oral communication)**

    Note: Telephones are commonly used in the surgical suite for requesting information or supplies and for receiving information about patients.

    a. Be courteous.

    b. Speak clearly and distinctly.

    c. Ask other person to speak more loudly or repeat information if you can not hear well.

    d. Identify yourself.

    Note: This is important both when you are placing and receiving calls.

    e. Identify other party if they did not identify themselves.

    f. Record all information clearly and accurately.

    g. Make a note of the time of the call.

    h. Verify all information that you have recorded. Repeat what you have written.

    i. Only licensed personnel can record doctor's orders.

Information Sheet

12. Forms of communication written by surgical technologists

a. Personal records

Examples: Resumés, employment applications, formal letters of application or resignation

b. Hospital records

Examples: Supply requests, charges, incident reports, count records

c. Patient records

Note: Information on patient records is legal documentation and must be accurate.

13. Body language signals (nonverbal communication)

Note: Body language, as well as voice inflections and tone, provide clues to one's feelings and attitudes, and will either reinforce or contradict what is said verbally. Since studies have shown that nonverbal communication has a higher validity than verbal communication, it is important to watch for and recognize what people are communicating through their nonverbal signals.

a. Positive gestures, expressions, and stances

(1) Eye contact — Attentive, listening

(2) Smiling — Agreement, pleasure, humor

(3) Open stance (arms unfolded, legs uncrossed) — Friendly, receptive, undefensive

(4) Hand stroking chin — Thoughtful consideration

(5) Hand on cheek — Thinking, interested, attentive

(6) Sitting with feet flat on floor — Poised

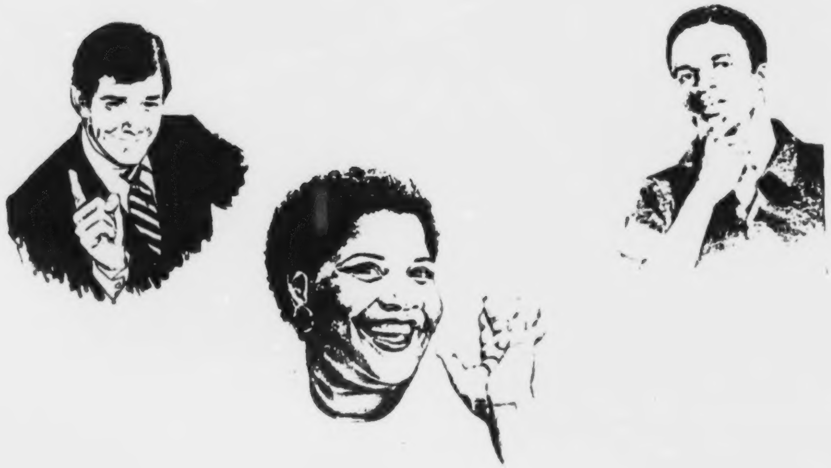
(7) Sitting slightly forward in chair — Attentive

(8) Leaning slightly forward toward person — Attentive, involved

Information Sheet

(9) Head nodding up and down — Agreement, support

Figure 4 — Positive examples



b. Negative gestures, expressions, and stances

(1) Tapping fingers, cracking knuckles, wringing hands, tugging hair — Lack of confidence, uneasiness, boredom, nervousness

(2) Moving around in chair — Restlessness

(3) Clenched fist — Hostility, lack of acceptance

(4) Arms folded tightly high on chest — Closed, defensive, disagreement, discomfort, withdrawing from conversation

(5) Side of head leaning on hand — Boredom or tiredness

(6) Raised eyebrows — Surprise, doubt, indifference

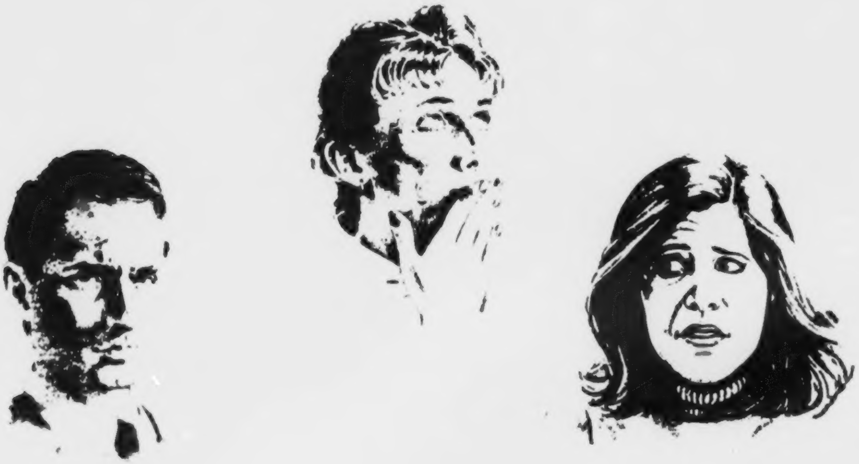
(7) Scowl or frown — Disapproval

(8) Lips pressed tightly — Anger, determination

Information Sheet

(9) Turning head from side to side — Disagreement

Figure 5 — Negative examples



Note: There are *many* others.

14. Importance of effective communication for the patient undergoing surgery

a. Communication is the basis for the continuum of patient care and teamwork among the staff.

b. Patients under the stress and anxiety of the upcoming surgery have a deep need to communicate their feelings or their emotional and physical needs to the health care team.

c. Patients indicate their needs by what they say and by what they do not say. The surgical team must listen and observe for both types of communication—verbal and nonverbal.

d. Effective communication can influence:

(1) The patient's behavior while in the operating room suite, and in the hospital later.

(2) The patient's attitude toward surgery and health care workers.

Information Sheet

15. Techniques for therapeutic communication

a. **Using broad opening statements**

Examples: "Is there something bothering you? Is there something you'd like to talk about?"

b. **Using general leads**

Examples: "Yes . . . Oh? . . . Go on . . . I see . . . Um hum."

c. **Giving information to the patient**

Examples: "My name is Mary Jones. I'm taking you to the operating room where your surgery is scheduled."

d. **Sharing observations with patient**

Examples: "You're trembling. You seem upset. Am I wrong?"

Note: By sharing observations, the patient has the opportunity to verify, correct, or elaborate the observation. This encourages the patient to communicate, and prevents you from assuming the meaning behind the patient's behavior. In the above example, the patient may have been cold.

e. **Acknowledging the patient's feelings**

Example: Patient: "I hate waiting here."
Care giver: "Yes, it must be frustrating for you."

f. **Reflecting (paraphrasing)** — All or part of the patient's statement is repeated or slightly rephrased to encourage the patient to go on.

Note: This can be very effective, but it can also be overused.

Example: Patient: "I hate waiting here. I'm so frustrated."
Care giver: "You are frustrated with waiting."

g. **Selective reflecting** — One part of the patient's statement is repeated or rephrased to encourage further exploration of that part.

Example: Patient: "I'm tired, and I don't like it here"
Care giver: "You're tired?"

h. **Using silence** — Allows patient to collect his/her thoughts

Example: Patient" "I, well, I just don't, well . . . "
Care giver: . . .

Information Sheet

i. **Clarifying** — Helps to avoid misunderstanding

Example: "I'm not sure I understand. Are you saying that . . . ?"

j. **Validating** — To make sure that the patient's needs have been met

Example: Care giver: Covers patient. Then says, "Are you warmer now?"
Patient: "Yes."
Care giver: "Is there anything else you need?"
Patient: "No. I'm fine now."

16. **Blocks to therapeutic communication**

a. **Using clichés**

(1) Reduces your anxiety (when you don't know what to say) rather than reducing the patient's anxiety.

(2) Blocks communication because these clichés minimize the significance of the patient's feelings, or tell the patient that you're not interested.

Examples: "Everything will be ok." "You don't need to worry." "Have a nice day."

b. **Giving advice** — Imposes your opinions and solutions on patients rather than having them explore for their own solution

Example: "What you should do is . . . "

c. **Giving approval or agreement** — Shifts the focus of the discussion to your values and feelings

Examples: "Yes, that's good." "I agree with you."

d. **Requesting an explanation** — "Why" questions can be intimidating because patient is asked to immediately analyze and explain their feelings or actions.

Example: "Why are you doing (or saying) that?"

e. **Belittling the patient's feelings** — Makes the patient feel that his/her feelings are not important or unique, and that the patient is not unique. Shifts the conversation away from the patient which blocks communication.

Example: Patient: "I wish I were dead."
Care giver: "I know just how you feel. Everyone feels that way."

Information Sheet

f. **Expressing disapproval or disagreement with the patient** — Shifts the focus of the discussion to your values and feelings, and can cause anger, intimidation, defensiveness, and withdrawal in patient.

Example: "That's not good." "You're wrong."

g. **Defending** — Tells patients they have no right to express negative comments or opinions

Example: Patient: "I don't like this old hospital."
Care giver: "This is **not** an old hospital. We have the most up-to-date equipment that you could find anywhere in this state."

h. **Changing the subject** — Takes the lead away from the patient, and focuses conversation on what you want to talk about rather than what they wanted to talk about (which may have been making you uncomfortable).

Example: Patient: "I wish I could just die."
Care giver: "How did you sleep last night?"

17. **Communication requirements while in surgery**

a. Listen carefully and speak clearly. More effort is required for good communication because of the operating room masks.

b. Communicate professionally by understanding and using correct medical and operating room terminology.

c. Communicate therapeutically with patients and their families.

d. Follow verbal (oral and written) directions quickly and correctly.

e. Respond to and use nonverbal communication techniques as needed in surgery.

Note: Nonverbal communication helps in surgery to cut down on talking which can be distracting to members of the surgical team and may be upsetting to the patient. Signals and gestures can also be faster than verbal explanations of what is needed.

Interpersonal Relationships and Communication Skills
Unit 2-A

Assignment Sheet 1—Evaluate Your Interpersonal Relationship Skills

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Questions are answered honestly	______
Suggestions for improvement are appropriate	______
Correct grammar, punctuation, and spelling are used	______

Introduction: Your interpersonal relationships can provide support during times of stress and can help you learn and grow as a surgical technologist.

Directions: Answer the following questions by circling yes or no. Then describe in the last section ways you can improve your interpersonal relationships.

Social relationships

Yes	No	1.	I make friends easily with males.
Yes	No	2.	I make friends easily with females.
Yes	No	3.	I have several close friends.
Yes	No	4.	I feel close to several family members.
Yes	No	5.	I can express my feelings and ideas without worrying about what my friends will think.
Yes	No	6.	I am not afraid to ask for help when I need it or ask questions when I don't understand.
Yes	No	7.	I can give and accept compliments.
Yes	No	8.	When working in a group, I can accept other people's ideas and suggestions.
Yes	No	9.	I spend most of my free time with friends or family.
Yes	No	10.	I have someone that I can talk to about personal problems.

Assignment Sheet 1

Professional relationships

Yes	No	1.	I understand and follow the code of ethics for medical professionals.
Yes	No	2.	I understand and follow the policies and procedures of the medical institution where I work/train.
Yes	No	3.	I feel that I am an important member of the health care team.
Yes	No	4.	I use constructive criticism from my superiors to improve my performance on the job.
Yes	No	5.	I can express my opinions about work situations without feeling intimidated by co-workers.
Yes	No	6.	I am comfortable with the current stress level at work.
Yes	No	7.	I have someone at work that I can talk to about job problems.
Yes	No	8.	I avoid gossiping about people.
Yes	No	9.	I am comfortable carrying on a conversation with a superior.
Yes	No	10.	I am not afraid to ask for help when I need it or ask questions when I don't understand.

Therapeutic relationships

Note: Disregard this section if you have not worked with patients or their families.

Yes	No	1.	I understand and follow the code of ethics for medical professionals.
Yes	No	2.	I understand and follow the policies and procedures of the medical institution where I work/train.
Yes	No	3.	I feel comfortable talking to patients.
Yes	No	4.	I feel comfortable talking to patients' families.
Yes	No	5.	I keep in mind the patient's needs as I work with them.
Yes	No	6.	I give my best effort when working with patients.
Yes	No	7.	I understand my responsibility to the patient.
Yes	No	8.	I respect the patient's rights.
Yes	No	9.	I enjoy working with patients.
Yes	No	10.	I can cope with both disappointment and success.

Assignment Sheet 1

Suggestions for Improvement

1. One way that I could improve my social relationships is to ______________________

   ____

   ____

   ____

2. One way that I could improve my professional relationships is to ______________

   ____

   ____

   ____

3. One way that I could improve my therapeutic relationships is to ______________

   ____

   ____

   ____

Interpersonal Relationships and Communication Skills
Unit 2-A

Assignment Sheet 2—Evaluate Your Listening Skills

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Survey questions are answered honestly	______
Evaluation is scored correctly	______

Introduction: A good listener must participate actively in the communication process. As a surgical technologist you will be expected to listen to all members of the surgical team, the patient, and many other employees in the medical facility. When lives are at stake, good listening skills are vital. This assignment will give you the chance to identify poor listening skills so you can change them.

Directions: Answer the following survey questions by placing a check in the box under "Often," "Sometimes," or "Seldom." Total your scores and refer to the analysis that follows.

LISTENING SURVEY	Often	Sometimes	Seldom
1. It is said that you think four times faster than the person talking to you. Do you use this excess time to turn your thoughts elsewhere while you keep general track of the conversation?			
2. Do you listen primarily for the facts rather than for the ideas?			
3. When you hear certain words, phrases, or ideas that you do not like, do you quit listening?			
4. When you are confused or irritated by what is being said, do you try to straighten out the matter immediately—either in your own mind or by interrupting the speaker?			
5. If you feel it would take too much time or effort to understand something, do you go out of your way to avoid hearing about it?			

Assignment Sheet 2

LISTENING SURVEY

	Often	Sometimes	Seldom
6. Do you deliberately turn your thoughts to other subjects when you think that the speaker has nothing interesting to say?			
7. Can you judge by a person's appearance and manner of speech that he/she will have nothing important to say?			
8. Do you try to give a person the impression that you are listening when you are not?			
9. Are you easily distracted by movements, sounds, or outside activities when you are listening to someone?			
10. Do you record detailed notes of everything said if you only want to remember the main ideas?			

Total ____________________

LISTENING ANALYSIS

- If you scored four or more in the "Often" column, you have poor listening habits. Look at the questions you checked "Often." What poor listening habits do they describe? The first step to good listening is to recognize your poor listening habits. Then you must work to improve your listening skills.
- If you scored seven or more in the "Sometimes" column, you are generally a good listener, but you need to practice your listening skills more consistently for improvement.
- If you scored seven or more in the "Seldom" column, you are generally an excellent listener. Work on those three or so that you scored "Sometimes" or "Often."

Interpersonal Relationships and Communication Skills
Unit 2-A

Assignment Sheet 3—Apply Effective Communication Skills to Given Situations

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Questions are answered correctly	_____
Instructions are followed	_____
Correct grammar, spelling, and punctuation are used	_____

Introduction: Effective communication skills are the foundation for teamwork and patient care. This assignment will provide practice in application of effective communication skills to given situations.

Directions: After reviewing the presented situation, answer the questions regarding the situation.

Situation 1: You are given the assignment of presenting the rationale and technique of open gloving to the class.

1. According to the goals of communication, what is the purpose of your presentation?

   ____

2. Under the planning phase of preparing your presentation, briefly describe how you are planning to communicate the technique of open gloving to the class. __________

   ____

   ____

   ____

3. List three things to remember when presenting to the class.

   a. ____

   b. ____

   c. ____

Assignment Sheet 3

4. Briefly describe how you plan to incorporate nonverbal communication into your presentation. ______________________________

____

____

5. Describe how you will encourage feedback from your classmates. ______________

____

____

____

6. How will you know if your presentation has been effective? ______________

____

____

____

Situation 2: As a staff surgical technologist you are assigned the responsibility of working with three surgeons who have been trying to decide on the purchase of a new piece of equipment. The surgeons have been unable to decide on exactly which piece of equipment to purchase and from which company.

1. According to the goals of communications, what is the major goal of your assigned task? ______________________________

____

2. You have planned your presentation and have set up the time and place to meet with the three surgeons. As you enter the room, one doctor is sitting in the corner of the room with his legs crossed and his arms folded across his chest. The other two doctors are visiting and smiling.

    a. Briefly describe any positive nonverbal communications that are occurring.

    ____

    ____

Assignment Sheet 3

b. Briefly describe any negative nonverbal communications that are occurring.

____

____

3. Briefly describe two nonverbal communications that you will avoid in your presentation.

____

____

____

Interpersonal Relationships and Communication Skills
Unit 2-A

Assignment Sheet 4—Evaluate Therapeutic Communication Skills in Given Situations

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Questions are answered correctly	______
Instructions are followed	______
Correct grammar, spelling, and punctuation are used	______

Introduction: It is important to identify factors that influence communications and utilize appropriate communication tools to ensure quality care for individual patients.

Directions: Read each situation and answer the questions that follow.

1. A 43-year-old female is going to have a breast biopsy and possible mastectomy.

    a. Briefly describe one influencing factor that must be considered when interacting with the patient.

    ____

    ____

    ____

    ____

    b. Based upon the factor that you identified above, briefly describe a therapeutic communication tool that would be useful.

    ____

    ____

    ____

    ____

Assignment Sheet 4

2. You are assigned to transport a patient to the operating room. During this time the patient states that he is concerned about his son who was to get up on his own and get to the school bus.

   a. What level of needs does this example describe on Maslow's triangle?

   ____

   ____

   b. Briefly describe one therapeutic communication tool that would be appropriate in this situation. ______________________________

   ____

   ____

   ____

3. As you walk into the preoperative waiting area, you notice a patient who is shaking. Describe what action you would take to assess the patient's needs. ______________

   ____

   ____

4. A patient who is having surgery under general anesthesia is at what level on Maslow's triangle? ______________________________

   ____

   ____

Assignment Sheet 4

Note: Questions 5-9 are based on the following scenario.

You are asked to go to the preoperative waiting area to let a patient know that there has been a delay and that the circulating nurse will be bringing him back to the operating room in about fifteen minutes. You are aware of the following patient information: He is a) 16-year-old male, b) diagnosed with AIDs two years ago, c) hemophiliac, d) requires surgical removal of a malignant tumor in the large intestine, and e) the patient's father is waiting with the patient.

Identify the following examples as appropriate or not appropriate interactions by circling A for appropriate or NA for not appropriate. Give a brief rationale for your choice.

A NA 5. You start your conversation by addressing the patient's father and say, "The nurse will be here in about 15 minutes."

Rationale ______________________________

____

A NA 6. You address the patient by introducing yourself and calling the patient by his name.

Rationale ______________________________

____

A NA 7. The patient angrily says, "I know why no one wants to help me. They are afraid they'll get AIDS!" You respond, "Well, if you will just listen to me. The surgeon had to go the emergency room. You can trust us. We are professionals. Don't worry. Everything is going to be OK."

Rationale ______________________________

____

A NA 8. The father asks you to stay with his son while he goes to talk with the other family members. You stay and ask the patient if there is anything you can do to make him more comfortable. You sit in the chair next to the patient.

Rationale ______________________________

____

Assignment Sheet 4

A NA 9. The patient says that he is fine, but you notice that he is shaking. You say, "Why are you shaking?"

Rationale

A NA 10. A 4-year-old female patient is waiting with her mother in the preoperative waiting room. The child is clinging to her mother. Describe two factors that will influence the care givers' interactions with the child and mother.

For questions 11-14, read each of the following examples and decide if they are appropriate when considering a patient's cultural/ethnic needs. If the example given is appropriate, circle the A. If it is not appropriate, circle the NA. Following each example give a brief rationale.

A NA 11. An interpreter is used for communications prior to taking a patient to surgery and stays until the patient is asleep.

Rationale

A NA 12. A patient is allowed to keep a religious symbol with him into surgery.

Rationale

A NA 13. A patient constantly looks away and nods up and down to all questions. The care giver assesses that the patient understands all questions.

Rationale

Assignment Sheet 4

A NA 14. A care giver feels that by asking if the patient has any questions he/she has adequately assessed the patient's understanding and need for information.

Rationale ____

____

15. During a surgical procedure the surgeon accuses the surgical technologist of poor work and says that she might as well leave. Describe an appropriate way to deal with this comment.

____

____

____

____

____

____

Legal and Ethical Responsibilities
Unit 3-A

Objective Sheet

Unit Objective

After completing this unit, the student should be able to complete statements concerning surgical conscience and ethics and match areas of legal responsibility with the correct descriptions. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

1. Match terms related to legal and ethical responsibilities with their correct definitions.
2. Match common areas of legal responsibility in surgery affecting the surgical technologist with the correct descriptions.
3. List operating room incidents that could result in litigation.
4. Discuss surgical conscience.
5. Complete statements concerning ethics.
6. List items in the surgical technologist's code of ethics.
7. Complete statements concerning standards of professional practice.
8. Select true statements concerning a patient's bill of rights.
9. Evaluate legal cases involving surgery. (Assignment Sheet 1)
10. Evaluate ethical issues facing medicine. (Assignment Sheet 2)

Legal and Ethical Responsibilities
Unit 3-A

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make a transparency from the transparency master included with this unit. This appears in the teacher edition only and is designed to be used with the following objective:

   TM 1—Areas of Legal Responsibility (Objective 2)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Evaluation

12. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

13. Make copies of the written test. Add or modify test items as needed.

Suggested Activities

14. Give written test.

15. Record assignment sheet ratings and written test scores on the Unit Evaluation Form. Add any additional assignments or supplemental activities that should be part of the unit evaluation.

16. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Acquaint students with their legal responsibilities at local medical facilities by showing them copies of the facilities' policies and procedures manuals. This will reinforce **reading foundation, communication,** and **personal management skills**.

2. Discuss and help students distinguish between the ethical obligations and the legal obligations of the surgical technologist. This discussion reinforces **communication, critical thinking, personal management, group effectiveness,** and **leadership skills**.

3. Invite an attorney with medical ethics or medical malpractice experience to talk to the class. Have the attorney discuss the following:

   a. Legal issues that could impact on the students' careers, any changes in the laws affecting surgical technologists, and how they can protect themselves.

   b. Liability insurance and whether or not the surgical technologist would need additional coverage over any provided by local medical facilities.

   Have students prepare questions beforehand to ask the attorney. After the presentation and discussion, have students summarize the attorney's main points. This activity reinforces **writing foundation, communication,** and **creative thinking skills**.

4. Arrange for students to observe a licensing board hearing for an RN or LPN. This activity can reinforce the idea of legal accountability, as well as use **communication, group effectiveness,** and **influence skills**.

Suggested Activities

5. Discuss ways to show respect to patients in the following areas:

   a. Privacy
   b. Property
   c. Dignity (worthiness)
   d. Identity (individuality)

6. Show a video dealing with ethical and/or legal issues facing medicine. Many of the tapes in the "Suggested Supplemental Resources" are meant to trigger discussions. Students should examine their feelings about these sensitive issues before they are assigned to a case. Videos and discussions help reinforce **communication skills, personal management skills,** and **influence skills**.

7. Discuss historical figures who have contributed to the advancement of medicine. Refer to Teacher Supplement 1 for a listing of their names and contributions. **Communication skills**.

8. Discuss famous people of today, such as heart surgeons and AIDs or virus researchers, who are making significant advancements in medicine. Discuss how their work can impact on the surgical technologist. **Communication skills**.

9. Give students a copy of the Hippocratic oath. Have them read it aloud together, and discuss what it means to them as a surgical technologist. **Communication skills**.

10. Discuss recent incidents or legal court cases in which legal or ethical issues were in question. Without using real names, discuss how the incidents were handled, and what your class could learn from these cases. **Communication skills** and **personal management skills**.

11. For Assignment Sheet 1, you may wish to divide the class into teams, and then assign only certain cases to each group. This may save time and will allow the team members to interact, reinforcing **teamwork skills**. After the teams are finished, have them report back to the entire class with their results. This also reinforces **communication** and **group effectiveness skills**.

12. For Assignment Sheet 2, you will need to check with the school or local library to see what resources you can recommend to the students. You may wish to assign the ethical issues to ensure that all issues are covered. You may also assign teams to research an issue, with part of the team researching one side and the other team members researching the opposing side. When the students are finished researching and writing, this would be a good opportunity for a panel discussion or debate. Although debates on ethics can get heated, stress to students that these same issues will come up when they are employed as surgical technologists, and it is helpful to have already discussed these issues and seen that every issue has two sides. This activity reinforces many basic academic and workplace skills including **communication, adaptability, personal management, group effectiveness,** and **influence skills**.

Suggested Activities

Resources Used in Developing This Unit

1. Allmers, Nancy and Joan Verderame. *Review for the Surgical Technology Examination*, 2nd ed. Connecticut: Appleton and Range, 1987.
2. *AORN Standards and Recommended Practices for Perioperative Nursing*. Denver: Association of Operating Room Nurses, Inc., 1991.
3. Association of Surgical Technologist. *Code of Ethics*. Littleton, CO. 1989.
4. Atkinson, Lucy. *Berry & Kohn's Introduction to Operating Room Technique*, 7th ed. St. Louis: C. V. Mosby Co., 1992.
5. Fuller, Joanna. *Surgical Technology: Principles and Practice*. Philadelphia: W. B. Saunders Co., 1986.
6. Rothrock, Jane C. and Margaret Huth Meeker. *Alexander's Care of the Patient in Surgery*, 9th ed. St. Louis: C. V. Mosby Co., 1991.

Suggested Supplemental Resources

1. Software — *Protecting Patient/Resident Rights*, 1991. Reviews rights in 16 areas. Then user plays a game to spot violations in care situations. Available from:

   Computerized Educational Systems
   307 Park Lake Circle
   P.O. Box 536905
   Orlando, FL 32853-6905
   800-275-1474

2. *Confidentiality: How Do You Plead?* 15 minute videotape discussing privacy, confidentiality, and professional ethics. Available from:

   Sacred Heart Medical Center
   c/o Care Video Productions
   1650 Crossings Parkway
   Westlake, OH 44145

3. *The Right to Die*. Filmstrip with cassette and discussion guide. Explores the moral, legal, and practical implications of extending life through medical technology. Available from:

   Career Aids
   20417 Nordhoff St. Dept. P N 9 8 7
   Chatsworth, CA 91311
   818-341-2535

Suggested Activities

4. *Patient Rights: The Art of Caring*, 1990. 18 minute videotape showing the Patient's Bill of Rights in hospital vignettes.

5. *Negligence and Malpractice*, 1984. 22 minute non-motion tape introducing the concept of sole or joint liability and conditions for proving negligence or malpractice.

6. *Consent to Treatment*, 1984. 18 minute non-motion tape defining implied and expressed consent.

7. *Professional Ethics*, 1984. 18 minute non-motion tape introducing the concept of professional ethics and the dilemmas in nursing practice.

8. *Advance Directives: Guidelines for Health Care Providers*, 1992. 15 minute motion tape presenting an overview of advance directives, legal implications, and patient considerations.

   4-8 are available from:

   Medcom/Trainex
   P.O. Box 3225
   Garden Grove, CA 92641
   800-877-1443 or 714-891-1443

9. *Decisions of the Heart*. 8 minute videotape that addresses the decision of whether or not to resuscitate and what that involves. Available from:

   American Journal of Nursing Company
   Educational Services Division
   555 West 57th Street
   New York, NY 10019-2961

10. *Living Wills*. 30 minute videotape that examines the concept of living wills and advanced directives.

11. *The Biology of Death*. 29 minute videotape discussing death, legal and social responses to death, and the role of society in investigating and regulating it.

12. *The Right to Die*. 28 minute videotape which address the question: Do dying patients have the right to die, or is it the obligation of society and the medical profession to keep patients legally alive as long as possible? Specially adapted from a Phil Donahue program.

Suggested Activities

13. *Medicine and Mercy*. 26 minute videotape that looks at both sides of the issue of ceasing artificial life-support systems.

    10-13 are available from:

    Films for the Humanities, Inc.
    Box 2053
    Princeton, NJ 08543-2053
    800-257-5126 or 609-452-1128

14. *Understanding Advance Directives*. 26 minute videotape explains how a person may make his or her wishes known before treatment is necessary. Summarizes legal developments with the practice of advance directives.

15. *The Courage of One's Convictions*. 15 minute videotape about a 17-year-old girl who refuses treatment because of religious convictions.

16. *Critical Choice*. 15 minute videotape about a hospital director who must choose between a liver transplant needed to save a child or funding a new program that could prevent 30 infants from dying within the next year.

17. *If You Want a Girl Like Me*. 13 minute videotape about a teenage mother refusing life-saving treatment for her newborn suffering from spina bifida and hydrocephalus.

18. *The Old Person's Friend*. 13 minute videotape about the dilemma of whether to allow an elderly woman to die as she seems to wish, or to give her antibiotics to preserve her life.

19. *Who Should Decide*. 13 minute videotape about parents deciding whether or not to terminate a pregnancy when they discover the unborn has spina bifida, the same disease as the mother.

    14-19 are available from:

    Pyramid Film and Video
    P.O. Box 1048
    Santa Monica, CA 90406-1048
    800-421-2304

20. *Doctors, Nurses, and Informed Consent*. 18 minute videotape discussing the legal implications of informed consent.

21. *Completing the Incident Report*. 12 minute videotape about proper documentation of an incident.

22. *The Legal Aspects of Negligence*. 20 minute videotape shows health care professionals how to protect themselves from claims of professional negligence.

Suggested Activities

23. *Confidentiality: Ethical and Legal Considerations.* 18 minute videotape shows vignettes with common breaches of confidentiality while an attorney comments on the implications for health care workers.

    20-23 are available from:

    Fairview Audio-Visuals
    17909 Groveland Avenue
    Cleveland, OH 44111
    216-476-7054

24. *Better Off Dead?* 60 minutes. 1984. Award winning documentary investigating the complex ethical choices about how far to go with medical care for newborns.

25. *The Right to Die.* 120 minutes. 1989. Features the complex legal and moral issues involved in the first right-to-die case to reach the Supreme Court.

26. *Last Rights.* 60 minutes. 1987. Discusses euthanasia, "living wills," and legal issues being debated in U.S. courts.

27. *The Fight Against Infectious Disease: From Yellow Fever to AIDS.* 60 minutes. 1987. Chronicles the historical progress of medicine against diseases.

    24-27 are available from:

    PBS VIDEO
    1320 Braddock Place
    Alexandria, VA 22314-1698
    800-424-7963

Legal and Ethical Responsibilities
Unit 3-A

Answers to Written Test

1.	a.	10	f.	15	j.	18	n.	5
	b.	21	g.	13	k.	8	o.	20
	c.	6	h.	3	l.	22	p.	2
	d.	7	i.	14	m.	1	q.	4
	e.	17						

2.	a.	6	d.	4
	b.	3	e.	1
	c.	7	f.	2

3. Any ten of the following:

   a. Misidentification of patient
   b. Incorrect procedure
   c. Incorrect sponge, needle, or instrument counts
   d. Burns, falls, or injuries
   e. Abandonment
   f. Incorrect positioning
   g. Improper care of specimens (including loss or misidentification
   h. Incorrect drugs or incorrect administration
   i. Use of defective equipment or instruments
   j. Improper care of patient's property (including loss or damage)
   k. Lack of informed consent
   l. Major break in aseptic technique
   m. Documentation errors
   n. Failure to observe critical events and to take appropriate action
   o. Exceeding authority or accepted functions
   p. Assault and battery
   q. Breach of confidentiality
   r. Invasion of privacy
   s. Defamation

4. Discussion should include the following in the student's own words:

   a. Surgical conscience involves:
      (1) Protecting the patient from physical hazards in the operating room
      (2) Understanding the patient's fears and anxieties concerning surgery
      (3) Respecting the patient's rights to privacy, property, dignity, and identity
      (4) Treating patients equally, without discrimination
   b. Surgical conscience is based upon an attitude of truly caring about a patient.
   c. Surgical conscience involves honesty in:
      (1) Your actions
      (2) Your capabilities and qualifications

Answers to Written Test

5. a. Any one of the following: cultural, social, economic, or religious
   b. Laws
   c. Nonmaleficence
   d. Autonomy

6. Any five of the following:

   a. To transport, position, and restrain patients without bodily injury
   b. To be morally and ethically responsible and legally accountable to patients for performance
   c. To meet the patient's physical, psychological, and spiritual needs
   d. To respect the patient as an individual
   e. To be familiar with the Patient's Bill of Rights and statutes governing allied health practice
   f. To monitor the patient for deviations from expected responses requiring immediate action
   g. To document events factually and legibly
   h. To verify patient records as complete
   i. To verify on records that patient care has been rendered in accordance with set policies and procedures
   j. To recognize the limits of a surgical technologist's responsibilities to self, profession, and employer

7. a. Ethical
   b. Medical facility
   c. Litigation
   d. Teamwork
   e. Environmental safety

8. a. T
   b. T
   c. T
   d. F
   e. T
   f. F
   g. F
   h. T
   i. T
   j. T
   k. F
   l. T

Legal and Ethical Responsibilities
Unit 3-A

Written Test

Name ______________________________ Score ______________

1. Match legal terms on the right with the correct definitions.

______a. The occurrence speaks for itself

______b. A spoken defamation of character; an untruthful oral statement about a person that subjects that person to ridicule or contempt

______c. An illegal act against society

______d. Wrongs of slander and libel

______e. A lawsuit

______f. To be legally bound, as to make good any loss or damage that occurs in a transaction; to be answerable; to be responsible

______g. A person having special training or experience who assists a judge and jury in their decision-making process

______h. The degree of negligence in which each of the parties may be shown to have been responsible for the injury complained of

______i. A serious crime punishable by law with penalties ranging from imprisonment to death

______j. Improper, careless, or ignorant treatment; an act of negligence as applied to a professional person such as a physician, nurse, or dentist

1. Assault
2. Battery
3. Comparative negligence
4. Complaint
5. Confidential communication
6. Crime
7. Defamation
8. Defendant
9. Doctrine of reasonable man
10. Doctrine of res ipsa loquitur
11. Doctrine of respondeat superior

Written Test

______k. A person accused of a tort or crime who is required to make answer in a legal action or suit

______l. A legal wrong committed by one person involving injury to another person or loss of or damage to personal property

______m. Unlawful threat to harm another physically

______n. A statement made to a lawyer, physician, or clergyman in confidence and implicitly understood that it shall remain a secret

______o. One who commences a legal action or suit to obtain a remedy for an injury to his/her rights; the complaining party

______p. The carrying out of physically-threatened harm

______q. A legal process charging a party with a wrong done or a crime committed

12. Ethics
13. Expert witness
14. Felony
15. Liable
16. Libel
17. Litigation
18. Malpractice
19. Misdemeanor
20. Plaintiff
21. Slander
22. Tort

2. Match common areas of legal responsibility in surgery affecting the surgical technologist on the right with the correct descriptions.

______a. State of being answerable or responsible; being legally bound, as to make good any loss or damage that occurs in a transaction

______b. The expectation that an individual may be called to account for actions taken which were consistent with the responsibilities for which he or she contracted by virtue of employment or learner experience

______c. A wrong that violates a person's right to be free from unauthorized intrusion

1. Incompetence
2. Negligence
3. Accountability
4. Lack of proper supervision
5. Breach of confidentiality
6. Liability
7. Invasion of privacy

Written Test

_____ d. The supervisor, instructor, or physician is absent while the surgical technologist is performing his/her responsibilities, or the supervisor, instructor, or physician is not near enough to the technologist to give assistance

_____ e. Being unqualified or inadequate to perform a duty or duties

_____ f. The lack of care or skills that any person in the same situation would be expected to use

3. List ten operating room incidents that could result in litigation.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

j. ____________________

4. Discuss surgical conscience. Be sure to define the concept, and discuss what it involves.

____

____

____

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____

Written Test

5. Complete the following statements concerning ethics by filling in the blanks with the correct words.

   a. Ethics are influenced by ________________ backgrounds and life experiences.

   b. Ethics and ________________ are closely related because legal doctrines often interpret ethical concepts.

   c. The ethical principle called ________________ is the duty to do no harm.

   d. ________________ is the freedom of choice and the ability one has to make decisions to determine the course of action.

6. List five items in the surgical technologist's code of ethics.

   a. ____

   ____

   b. ____

   ____

   c. ____

   ____

   d. ____

   ____

   e. ____

   ____

Written Test

7. Complete the following statements concerning standards of professional practice by circling the words which best complete the statements.

   a. Standards of professional practice describe activities related to quality assurance and (private, ethical) behavior.

   b. Standards are set and maintained by each (individual, medical facility) to provide guidelines for patient care and safety.

   c. Personnel must adhere to set policies and procedures to protect themselves, other workers, and the medical facility from (litigation, bad publicity).

   d. One standard says that (individuality, teamwork) is essential for perioperative patient care.

   e. One standard ways that the preparation of the surgical suite and all supplies and equipment will ensure (neat appearances, environmental safety) for patients and personnel.

8. Select true statements concerning a patient's bill of rights by placing a "T" or "F" next to the true or false statements.

______a. The right to considerate and respectful care

______b. The right to obtain from the physician complete current information concerning his/her diagnosis, treatment, and prognosis in terms the patient can reasonably be expected to understand

______c. The right to receive from the physician information necessary to give informed consent prior to the start of any procedure and/or treatment

______d. The right to refuse all treatment regardless of what is permitted by law

______e. The right to every consideration of privacy concerning the patient's medical care program

______f. The right to know that all communications and records pertaining to the patient's care are treated as open information

______g. The right to expect that within its capacity a hospital must make reasonable response to the request of a patient for free service

______h. The right to obtain information as to any relationship of the involved hospital to other health care and educational institutions in so far as the patient's care is concerned

Written Test

_______i. The right to be advised if the hospital proposes to engage in or perform human experimentation affecting the patient's care or treatment

_______j. The right to expect reasonable continuity of care

_______k. The right to examine and receive an explanation of the patient's bill only if the patient has acceptable insurance

_______l. The right to know what hospital rules and regulations apply to the patient's conduct

***Permission to duplicate this test is granted.**

Legal and Ethical Responsibilities
Unit 3-A

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Evaluate Legal Cases Involving Surgery Rating _____

Comments: ____

____

Assignment Sheet 2—Evaluate Ethical Issues Facing Medicine Rating _____

Comments: ____

____

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ____

____

Teacher Signature ______________________________ Date __________

Student Signature ______________________________ Date __________

*Permission to duplicate this form is granted.

Legal and Ethical Responsibilities
Unit 3-A

Teacher Supplement 1—Individuals Who Contributed to the Advancement of Medicine and Surgery

A. Hippocrates (460-377 B.C. approximately) — Greek physician considered the "Father of Medicine;" his oath is still used in medical schools today

B. Galen (130-200 A.D.) — Greek physician and writer whose writings (along with Hippocrates') were the authority for medicine for many centuries; upheld high standards of technique for his time

C. Andreas Vesalius (1514-1564) — Belgian anatomist and artist who is considered the "Chief Founder of the Modern Study of Anatomy" because of his animal experiments and dissections on human cadavers

D. William Harvey (1578-1657) — English physician and anatomist who discovered the circulation of blood but did not know how blood got from arteries to veins (through capillaries)

E. Ambriose Paré — French army surgeon in the 16th century who revived the use of ligatures to control hemorrhage

F. Marcello Malpighi (1628-1694) — Italian anatomist who first discovered capillaries, and is known as the "Father of Histology" (the study of tissues in detail)

G. Anton van Leeuwenhoek (1632-1723) — Dutch merchant who made simple microscopes and first saw microorganisms through them

H. Giovanni Battista Morgagni (1682-1771) — Italian anatomist who is known as the "Founder of Pathologic Anatomy"

Note: Many structures of the body are named after him such as the "cyst of Morgagni."

I. Oliver Wendell Holmes, Sr. (1809-1894) — American physician and author who coined the term "anesthesia" which literally means "without sensation or feeling;" in 1843 wrote of the contagious nature of puerperal (childbed) fever, and expressed the belief that it was carried by nurses and doctors from patient to patient

J. Ignaz Semmelweis (1818-1865) — Austrian physician who established the true cause of puerperal fever, and required the doctors and medical students on his wards to wash their hands in chlorinated lime solution before examining patients

K. Crawford Long (1815-1878) — American surgeon from Athens, Georgia who first discovered and used ether in Macon General Hospital to remove small skin tumors from his patients, but he did not publish his results until 1849

Teacher Supplement 1

L. William Morton (1819-1868) — American dentist from Boston who in 1846 gave the first **public** demonstration of the use of ether as an anesthetic agent

Note: This brought ether into use for surgical operations.

M. Louis Pasteur (1822-1895) — French chemist who greatly contributed to bacteriology and immunology, developed technique for immunization, and founded science of microbiology

Note: In his work with wine, he showed that wine's fermentation was due to minute organisms, whose growth could be controlled by using heat. Thus, he developed the process of pasteurization, named after him.

N. Joseph Lister (1827-1912) — English surgeon who promoted the importance of cleanliness to prevent surgical wound infections; called the "Father of Modern Antiseptic Surgery"

O. Robert Koch (1843-1910) — German bacteriologist who developed postulates (criteria) for proving whether or not an organism is the cause of a disease; known as the "Father of Immunology"

P. Willhelm Roentgen (1845-1923) — German physicist who discovered x-rays or Roentgen rays in 1895

Q. William Halsted (1852-1922) — American surgeon who taught at Johns Hopkins Hospital in Baltimore from 1893-1922; perfected and brought into use many techniques which are still in use today. Among his most famous inventions, procedures, and techniques are:

  1. Perfecting a fine-pointed hemostat for clamping bleeding vessels
  2. Advocating excellent principles of tissue handling
  3. Developing an interrupted silk-suture closure technique
  4. Wearing rubber gloves

R. Marie Curie (1867-1934) — Polish-French physicist and chemist who isolated the element radium as a metallic substance

S. Harvey Cushing (1869-1939) — American surgeon who made many contributions to neurosurgery, including introducing silver clips for hemostasis, describing the relationship between intracranial pressure and blood pressure, and discussing pituitary basophilism (Cushing's disease); known as the "Father of Modern Neurosurgery"

T. W. T. Bovie — American physicist who developed the first spark-gap tube generator in the 1920s which was the universal basis of electrosurgical units until the 1970s when solid-state units became available

Areas of Legal Responsibility

Liability
Accountability
Invasion of Privacy
Lack of Proper Supervision
Incompetence
Negligence
Breach of Confidentiality

Legal and Ethical Responsibilities
Unit 3-A

Information Sheet

1. **Terms and definitions**

   a. **Assault** — Unlawful threat to harm another physically

   b. **Battery** — The carrying out of physically-threatened harm

   c. **Comparative negligence** — The degree of negligence in which each of the parties may be shown to have been responsible for the injury complained of

   d. **Complaint** — A legal process charging a party with a wrong done or a crime committed

   e. **Confidential communication** — A statement made to a lawyer, physician, or clergyman in confidence and implicitly understood that it shall remain a secret

   f. **Crime** — An illegal act against society

   g. **Defamation** — Wrongs of slander and libel

   h. **Defendant** — A person accused of a tort or crime who is required to make answer in a legal action or suit

   i. **Doctrine of reasonable man** — The right of the patient to expect that professional and technical personnel will perform their duties and meet the standards of other reasonable, prudent, and honest personnel involved in similar circumstances

   j. **Doctrine of res ipsa loquitur** — The occurrence speaks for itself

   k. **Doctrine of respondeat superior** — The master (employer) will answer for the acts of the servant (employee)

   l. **Ethics** — Rules or standards governing the conduct of the members of a profession

   m. **Expert witness** — A person having special training or experience who assists a judge and jury in their decision-making process

   n. **Felony** — A serious crime punishable by law with penalties ranging from imprisonment to death

   o. **Liable** — To be legally bound, as to make good any loss or damage that occurs in a transaction; to be answerable; to be responsible

Information Sheet

p. **Libel** — A **written** defamation of character; an untruthful written statement about a person that subjects that person to ridicule or contempt

q. **Litigation** — A lawsuit

r. **Malpractice** — Improper, careless, or ignorant treatment; an act of negligence as applied to a professional person such as a physician, nurse, or dentist

s. **Misdemeanor** — A crime of lesser offense than a felony, punishable by fines or imprisonment, usually for less than one year or both

t. **Plaintiff** — One who commences a legal action or suit to obtain a remedy for an injury to his/her rights; the com**plain**ing party

u. **Slander** — A **spoken** defamation of character; an untruthful oral statement about a person that subjects that person to ridicule or contempt

v. **Tort** — A legal wrong committed by one person involving injury to another person or loss of or damage to personal property

2. **Common areas of legal responsibility in surgery affecting the surgical technologist**

a. **Liability** — State of being answerable or responsible; being legally bound, as to make good any loss or damage that occurs in a transaction

b. **Accountability** — The expectation that an individual may be called to account for actions taken which were consistent with the responsibilities for which he or she contracted by virtue of employment or learner experience

c. **Invasion of privacy** — A wrong that violates a person's right to be free from unauthorized intrusion

d. **Lack of proper supervision** — The supervisor, instructor, or physician is absent while the surgical technologist is performing his/her responsibilities, or the supervisor, instructor, or physician is not near enough to the technologist to give assistance

e. **Incompetence** — Being unqualified or inadequate to perform a duty or duties

f. **Negligence** — The lack of care or skills that any person in the same situation would be expected to use

Note: Negligence may be doing the unexpected (commission) or not doing the expected (omission).

g. **Breach of confidentiality** — A break or violation of the obligation to keep a patient's records and confidences private

Information Sheet

3. Operating room incidents that could result in litigation

a. Misidentification of patient

b. Incorrect procedure

c. Incorrect sponge, needle, or instrument counts

d. Burns, falls, or injuries

e. Abandonment

f. Incorrect positioning

g. Improper care of specimens (including loss or misidentification)

h. Incorrect drugs or incorrect administration

i. Use of defective equipment or instruments

j. Improper care of patient's property (including loss or damage)

k. Lack of informed consent

l. Major break in aseptic technique

m. Documentation errors

n. Failure to observe critical events and to take appropriate action

o. Exceeding authority or accepted functions

p. Assault and battery

q. Breach of confidentiality

r. Invasion of privacy

s. Defamation

Information Sheet

4. Surgical conscience

a. Surgical conscience involves:

  (1) Protecting the patient from physical hazards in the operating room

  (2) Understanding the patient's fears and anxieties concerning surgery

  (3) Respecting the patient's rights to privacy, property, dignity, and identity

  (4) Treating patients equally, without discrimination

b. Surgical conscience is based upon an attitude of truly caring about a patient.

c. Surgical conscience involves honesty in:

  (1) Your actions

  (2) Your capabilities and qualifications

5. Ethics

a. Ethics are influenced by cultural, social, economic, and religious backgrounds and life experiences.

b. Ethics should govern professional conduct.

c. Ethics and laws are closely related because legal doctrines often interpret ethical concepts.

Note: Because individual ethics vary, laws are often passed to make actions illegal, even if some of society does not agree that they are unethical.

d. Principles of ethical decision-making in clinical practice include:

  (1) **Autonomy:** Freedom of choice and the ability one has to make decisions to determine the course of action

  (2) **Beneficence:** Duty to assist others in determining what is in their best interest or what may cause them harm

  (3) **Nonmaleficence:** Duty to do no harm

  (4) **Justice:** Distribution of resources a person has the right to receive or claim

  (5) **Fidelity:** Right of the individual to trust that his/her dignity, privacy, and confidentially will be protected

Information Sheet

6. **Surgical technologist's code of ethics**

   a. To transport, position, and restrain patients without bodily injury

   b. To be morally and ethically responsible and legally accountable to patients for performance

   c. To meet the patient's physical, psychological, and spiritual needs

   d. To respect the patient as an individual

   e. To be familiar with the Patient's Bill of Rights and statutes (laws) governing allied health practice

   f. To monitor the patient for deviations from expected responses requiring immediate action

   g. To document events factually and legibly

   h. To verify patient records as complete

   i. To verify on records that patient care has been rendered in accordance with set policies and procedures

   j. To recognize the limits of a surgical technologist's responsibilities to self, profession, and employer

   Note: This code of ethics was adopted by the Association of Surgical Technologists' Board of Directors in 1985.

7. **Standards of professional practice**

   a. Standards of professional practice describe activities related to quality assurances, education, ethical behavior, and accountability.

   b. Standards are set and maintained by each medical facility to provide guidelines for patient care and safety.

   c. Personnel must adhere to set policies and procedures to protect themselves, other workers, and the medical facility from litigation.

Information Sheet

d. Standards of practice to be followed by the surgical technologist

  (1) Teamwork is essential for perioperative patient care and is contingent upon interpersonal skills.

  (2) Preoperative planning and preparation for surgical intervention are individualized to meet the needs of the patient and the surgeon.

  (3) The preparation of the surgical suite/clinical area and all supplies and equipment will ensure environmental safety for patients and personnel.

  (4) Application of basic and current knowledge is necessary for a proficient performance of assigned functions.

  (5) Each patient's rights to privacy, dignity, safety, and comfort are respected and protected.

  (6) Every patient is entitled to the same application of aseptic techniques within the physical facilities.

8. **Patient's bill of rights**

  a. The right to considerate and respectful care

  b. The right to obtain from the physician complete current information concerning his/her diagnosis, treatment, and prognosis in terms the patient can reasonably be expected to understand

  c. The right to receive from the physician information necessary to give informed consent prior to the start of any procedure and/or treatment

  d. The right to refuse all treatment to the extent permitted by law, and to be informed of the medical consequences of that action

  e. The right to every consideration of privacy concerning the patient's medical care program

  f. The right to expect all communications and records pertaining to the patient's care should be treated as confidential

  g. The right to expect that within its capacity a hospital must make reasonable response to the request of a patient for services

  h. The right to obtain information as to any relationship of the involved hospital to other health care and educational institutions in so far as the patient's care is concerned

Information Sheet

i. The right to be advised if the hospital proposes to engage in or perform human experimentation affecting the patient's care or treatment

j. The right to expect reasonable continuity of care

k. The right to examine and receive an explanation of the patient's bill regardless of source of payment

l. The right to know what hospital rules and regulations apply to the patient's conduct

Note: These twelve rights have been recommended by the American Hospital Association.

Legal and Ethical Responsibilities
Unit 3-A

Assignment Sheet 1—Evaluate Legal Cases Involving Surgery

Name ______________________ Overall Rating __________

Evaluation criteria	Rating
Written evaluation is clear and concise	______
Correct rules of grammar, punctuation, capitalization, and spelling are followed	______

Directions: Read each of the following scenarios, and describe what could have been done to prevent the incident. Then state whether or not you agree with the court's decision and the amount awarded (if given).

A. A patient came out of surgery with a scalpel blade in his bladder necessitating later corrective surgery. The hospital contended that the nurse was a borrowed employee of the surgeon while in the operating room. Therefore, when the nurse failed to report a missing surgical instrument, the surgeon should have been liable. The court, however, said that operating room nurses may have two masters, and negligence may be attributed to both. The hospital and the surgeon had a mutual interest in treating the patient, and each would have benefitted by an accurate count of scalpel blades.

B. A physician removed a cyst from each of a patient's breasts for examination to see if the cysts were malignant. As they were removed, the cysts were placed in one container and were essentially undifferentiated. The scrub nurse asked if the surgeon wanted the specimens separated. He said no because they were not malignant anyway. One cyst was malignant. The plaintiff had to have both breasts removed. She was awarded $100,000 by the jury against both the surgeon and hospital.

Assignment Sheet 1

C. Action was brought against a surgeon when an electric cautery machine burned a patient during a hemorrhoidectomy. The machine had been used four times earlier that same day. The first two times that the surgeon attempted to use the machine during the hemorrhoidectomy, it did not deliver sufficient heat to cauterize the vessels, and the surgeon requested the circulating nurse to check it. Thereafter, the machine worked satisfactorily, and the operation was completed. After the operation, it was discovered that the patient was burned where she had come in contact with the electrode. The case was settled before trial as to the hospital and the nurse.

The court held the surgeon not liable, stating that where opportunities for prevention of injury to a patient depend on the care with which the equipment is monitored and with the selection and training or personnel to operate it, it is proper to place the burden of defective equipment and negligent personnel on the hospital.

D. A rongeur broke off while a surgeon was manipulating it in a patient's spinal column during a surgical procedure.

The court held that where an unconscious or helpless plaintiff suffers an admitted mishap unrelated to the scope of surgery and res ipsa loquitur applies, the burden of proof shifts to all those who owed the patient a duty of care or a duty not to furnish a defective instrument.

Assignment Sheet 1

E. A healthy 6-year-old boy was admitted to the hospital for corrective eye surgery. While in the operating room, he suffered cardiac arrest and brain damage, resulting in his becoming a spastic quadriplegic, blind, and mute. Testimony in the case indicated the following: 90 percent of deaths resulting from cardiac arrest during surgery occur because of faulty intubation; if the open-heart massage had been performed within three minutes of the heart's stopping, brain damage would not have occurred; an elevated temperature and apprehension increase the risk of complication; the child was very agitated before surgery and had an elevated temperature; the preoperative record of the patient's temperature had been altered to reflect a normal temperature. The court felt that all this evidence would permit the doctrine of res ipsa loquitur to be applied. Damages of $4 million were awarded.

F. The patient was told that a biopsy of his parotid gland needed to be done. This procedure would require a 1-inch incision in his neck.

Instead, the parotid gland was removed. The patient had a permanent 8-inch scar and a concavity in his neck. Subsequently, plastic surgery was required to remove the scar tissue.

The patient was awarded $50,000 in damages based on the inadequacy of the consent.

Assignment Sheet 1

G. A patient was admitted for skin grafting surgery. The surgeon was to remove a patch of skin from the front of her right thigh where she had previously sustained electrical burns. An alleged defect in the electrical surgical instrument, consisting of a bent spring impairing the usefulness of the depth setting adjustment of the instrument, caused deep cuts to the plaintiff.

A judgment of $10,000 was allowed to stand against the institution. The court stated that the surgeon should be able to rely on the hospital to furnish safe equipment.

H. The patient had extensive abdominal surgery. Postoperatively, the surgeon issued 11 orders including one requiring the checking and recording of the patient's vital signs — including temperature, pulse, respiration, and blood pressure every 15 minutes for 1 hour and then every hour for 10 hours. Despite this order, the patient's temperature was recorded only four times during a 24-hour period. During one such time gap the patient's temperature rose from 101.4 degrees F to 105.2 degrees F. On the day of surgery, a nurse placed tissue over the incision to stop the bleeding. The patient suffered severe brain damage.

The court held that the hospital failed to render reasonable postoperative care and that this caused an infection leading to fever and brain damage. The patient received an award of $800,000.

Assignment Sheet 1

I. A woman was brought into the hospital for a condition of the cervix. She was taken into the operating room by a surgical technician and was thought to be another patient who was to have a thyroidectomy. Within a short time, the surgeon was informed that he had the wrong patient on the operating table, and the surgery was terminated. The thyroidectomy was not completed, and such incisions as had been made were sutured and repaired. The patient had a 4-inch incision along her neck that became infected and required cosmetic surgery.

The court held that the jury's verdict of $100,000 was not excessive in view of the critical duty placed on the surgeon, the anesthesiologist, and the surgical technician to establish with absolute certainty the identify of a surgical patient. All parties admitted that they did not check the identity of the patient against the name on the bracelet. The fact that the patient responded to the wrong name was not accepted as a defense by the court.

____

____

____

____

J. A patient was admitted to a medical center for an anterior cervical fusion. Because of a mishap involving equipment used during surgery, he became a quadriplegic. The surgical resident used a Stryker plug cutter to remove bone from the vertebrae. When she removed the instrument, she found it had taken a full depth of vertebrae tissue and penetrated to the cortex. A scratch was noted in the instrument that could have caused a screw to slip.

The court stated that preoperative checks should be made on surgical equipment to prevent patient harm.

____

____

____

____

Assignment Sheet 1

K. A surgeon ordered a nurse to prepare a 10 percent cocaine solution with epinephrine for a tonsillectomy patient as an anesthetic. The patient convulsed and died. The physician had meant procaine. Even though the nurse repeated the order, she was found guilty for not questioning it. The nurse was convicted of manslaughter.

Legal and Ethical Responsibilities
Unit 3-A

Assignment Sheet 2—Evaluate Ethical Issues Facing Medicine

Name ________________________________ Overall Rating __________

Evaluation criteria	**Rating**
All questions are answered	______
One issue is researched	______
Sources are documented	______
Written evaluation is clear and concise	______
Correct rules of grammar, punctuation, capitalization, and spelling are followed	______

Directions: Respond to each of the following ethical questions by stating your present opinion.

ETHICAL ISSUES FACING MEDICINE

1. When does life begin? ______________________________
2. When does life end? ______________________________
3. Should medical technology be used to save a person's life? ______________
4. Should medical technology be used to prolong the lives of the chronically or terminally ill? ______________________________
5. Do patients have the right to refuse medical treatments that could save or prolong their lives? ______________________________
6. Do parents of the very young or children of the aged have the right to refuse treatments for these family members? ______________________________
7. Should euthanasia (mercy killing) be practiced by doctors? nurses? family members?

   ____
8. Should medical centers refuse treatment for patients who can not pay? __________
9. Who should pay for the medical care of patients who can not pay? __________

Assignment Sheet 2

10. Under what conditions, if any, should abortions be performed? ____________________

11. Under what conditions, if any, should sterilization or infertility procedures be performed?

____

12. Should genetic engineering be used to correct human genetic diseases? __________

Then select one question (or one selected for you by your instructor) and research both sides of the issue. Check your library for medical journals, as well as news magazines such as *Newsweek* or *Time* for others' opinions and for more information. You could also interview various people in your community for their opinions. These could include medical ethics committee representatives from a local medical center, family doctor, parents, church leaders, teachers, fellow students, etc. Be sure to include both sides of the issue.

Prepare a 1-2 page written evaluation of the issue, describing both sides of the argument, your opinion of the problem, and why you have that opinion. Conclude your evaluation by stating how this ethical issue can impact on your career as a Surgical Technologist. Provide bibliographic documentation of your sources. Include publications and interviews on your list.

Your instructor may wish to have you turn in the written report, or may prefer to have oral reports or panel discussions.

Operating Room Environment
Unit 4-A

Objective Sheet

Unit Objective

After completing this unit, the student should be able to complete statements concerning the operating room suite and operating room attire. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Complete statements concerning the physical layout of the operating room suite.
2. Distinguish between restricted and unrestricted areas of the operating room suite.
3. Identify equipment needed in each operating room.
4. Identify furniture needed in each operating room.
5. Select true statements concerning the components of operating room attire.
6. State purposes of operating room attire.
7. Select criteria for operating room attire.
8. Select true statements concerning general considerations of operating room attire.
9. Complete statements concerning personal health and hygiene.
10. Complete a worksheet concerning the hospital and operating room environment. (Assignment Sheet 1)
11. Evaluate your personal health and hygiene. (Assignment Sheet 2)

Operating Room Environment
Unit 4-A

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Operating Room Suite (Objectives 1 and 2)
   TM 2—Types of Body Covers (Objective 5)
   TM 3—Components of Operating Room Attire (Objective 5)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheets. Review criteria for evaluation of the activities.

12. Discuss the student supplement. This could be used as a homework assignment, practice exercise, or quiz. Explain to students how you plan to evaluate the supplement, if at all.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Obtain a copy of a local hospital's "policies and procedures" manual, and discuss with students specific procedures or information that varies from the information included in this unit. This activity reinforces the student's **problem solving (critical thinking) skills** by allowing the student to recognize and define problems, invent and implement solutions, and track and evaluate results.

2. Take students on a field trip to a local hospital or medical center, and discuss the following points, allowing time for students to take notes for completing Assignment Sheet 1:

    a. The general layout of the hospital and the relationship between the operating room suite and the other departments of the hospital.

    b. The restricted and unrestricted areas of the operating room suite.

    c. The equipment and furniture used in each operating room.

    d. The attire of the operating room personnel.

    This activity will emphasize **group effectiveness, interpersonal relations**, and **adaptability skills**.

Suggested Activities

3. Discuss the procedure that students will need to follow to enter the operating room suite. This activity will allow the student to adapt to the organization's goals, values, culture, and traditional modes of operation—**influence skills**.

4. Discuss the importance of good personal health and hygiene as a surgical technologist. This activity will develop self-confidence and create a positive self-image—**personal management skills**.

5. Have students don operating room attire and wear in class for approximately 30 minutes. Do not let them touch their heads or adjust their caps, masks, or eyewear. Then have them discuss how they felt and any difficulties they had. This activity can make students more comfortable with OR attire and appreciate the functions of the attire reinforcing **influence skills**. It can also reinforce **communication** and **group effectiveness skills**.

Resources Used in Developing This Unit

1. Fuller, Joanna. *Surgical Technology: Principles and Practice.* Philadelphia: W. B. Saunders Co., 1986.

2. Atkinson, Lucy Jo. *Berry & Kohn's Operating Room Technique*, 7th ed. Missouri: Mosby Year Book, 1992.

3. Meeker, Margaret Huth and Jane C. Rothrock. *Alexander's Care of the Patient in Surgery*, 9th ed. St. Louis: Mosby Year Book, Inc., 1991.

4. *AORN Standards and Recommended Practices for Perioperative Nursing.* Denver: Association of Operating Room Nurses, Inc., 1991.

Suggested Supplemental Resources

1. *Proper Surgical Attire: Fashion vs. Function* — 1992 (20 min.)

2. *This is Perioperative Nursing* — 1991 (19 min.)

3. *Traffic Patterns in the Surgical Suite* — 1983 (18 min.)

1-3 are available from:

Cine-Med Distribution Center
Davis & Geck
Video Library
PO Box 745
Woodbury, CT 06798
800-633-0004

Suggested Activities

4. *Perioperative Nursing* available from:

   AJN Company
   Educational Services Division
   555 West 57th Street
   New York, NY 10019-2961
   212-582-8820 or 800-CALL AJN
   Fax: 212-586-5462

5. *Surgical Masks: Making an Informed Choice* available from:

   Education Materials for Health Professional
   3-M Educational Material
   Computer Chrome
   2610 University Avenue
   St. Paul, MN 55114
   800-328-4827 Ext. 1205

Operating Room Environment
Unit 4-A

Answers to Student Supplement 1

1. b
2. d
3. b
4. d
5. b
6. d
7. d
8. b
9. d
10. d
11. b
12. b
13. a
14. a
15. b
16. d
17. a

Operating Room Environment
Unit 4-A

Answers to Written Test

1. a. Administrative personnel
   b. Any two of the following:
      (1) The number of beds in the hospital
      (2) The number and length of operations to be performed
      (3) The types of surgeries to be performed
      (4) The number of surgeons operating in that hospital and their distribution by specialty
   c. Any five of the following:
      (1) Central service
      (2) Laboratory (pathology)
      (3) Radiology (x-ray)
      (4) Preanesthesia holding room
      (5) Post anesthesia recovery (PAR) or recovery room (RR)
      (6) Blood bank
      (7) Intensive care unit (ICU)
      (8) Pharmacy
      (9) Emergency room
      (10) Out-patient, ambulatory, or same day surgery
      (11) Cardiac lab
   d. Exclude
   e. Restricted, unrestricted
   f. Hospital
   g. Corridors
   h. Storage and/or supportive activities

2. c, f, g, h, i, l

3. a. Anesthesia equipment and monitors
   b. Lighting devices
   c. X-ray illuminating light
   d. Outlets for suction and power equipment

4. a. Back table
   b. Ring stand
   c. Linen hamper and trash container
   d. Kick bucket
   e. Sitting stool
   f. Operating table
   g. Mayo stand
   h. Foot stool (platform or lift)

Answers to Written Test

5.

a.	F	g.	T	m.	F
b.	T	h.	F	n.	T
c.	T	i.	T	o.	F
d.	F	j.	F	p.	T
e.	F	k.	T	q.	T
f.	F	l.	F	r.	F

6. Any two of the following:

   a. To provide barriers that prevent spread of microorganisms to patient
   b. To protect surgery personnel (from the patient and each other)
   c. To protect the patient (from the surgery personnel and from himself/herself)
   d. To prohibit contamination of the sterile field and operative wound by direct body contact

7. a, c, d, e, f

8.

a.	T	e.	T
b.	F	f.	T
c.	T	g.	F
d.	F		

9. a. Any three of the following:
   (1) A daily bath and using deodorant
   (2) Skin in good condition
   (3) Hair that is clean, controlled, and free of dandruff
   (4) Daily oral hygiene
   (5) Clean, short nails without nail polish
   b. Any three of the following:
   (1) Sufficient rest and sleep
   (2) Proper exercise
   (3) Avoidance of undue fatigue and stress
   (4) No excessive use of alcohol, tobacco, or drugs
   c. Acute infection or symptoms of a communicable disease
   d. Scrub

Operating Room Environment
Unit 4-A

Written Test

Name ______________________________ Score ____________

1. Complete the following statements concerning the physical layout of the operating room suite by filling in the blanks with the correct answers.

   a. Each medical facility plans its operating room based on the needs determined by the surgeons, OR supervisors, and ______________________

   b. The number of operating rooms required in the operating room suite is determined by several factors. Name two.

      (1) ______________________________

      (2) ______________________________

   c. The OR suite should *ideally* be located near several ancillary units. Name five.

      (1) ______________________________

      (2) ______________________________

      (3) ______________________________

      (4) ______________________________

      (5) ______________________________

   d. The OR suite is located so as to ______________ outside traffic.

   e. The OR suite is divided into ______________ and ______________ areas.

   f. The OR suite is physically isolated or set away from the rest of the ______________.

   g. The OR suite usually contains an elaborate system of ______________ to control traffic and to separate sterile and unsterile areas.

   h. The OR suite is divided into two functional areas—(1) the procedure area for surgical treatment of patients and (2) the area for ______________.

Written Test

2. Distinguish between restricted and unrestricted areas of the operating room suite by placing an "X" next to the restricted areas.

______a. Dressing rooms

______b. Cast room

______c. Scrub areas

______d. Soiled laundry room

______e. Rest rooms

______f. Operating rooms

______g. Instrument room

______h. Equipment (storage) room

______i. Supply and storage rooms

______j. Lounge area

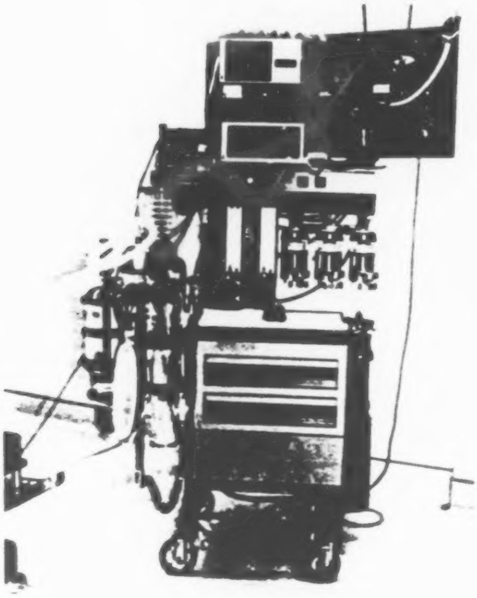
______k. Classroom or conference room

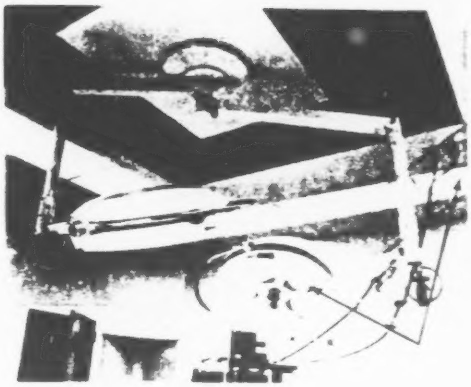
______l. Anesthesia room

______m. Posting and scheduling office

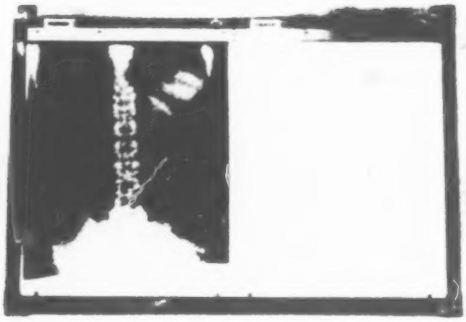
Written Test

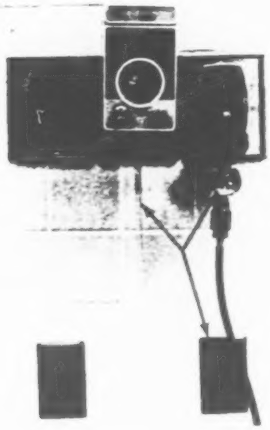
3. Identify the following equipment needed in each operating room.





a. ______________________ b. ______________________

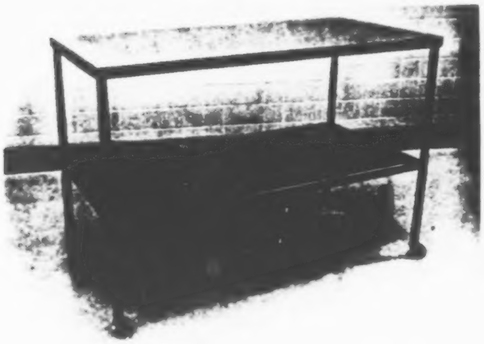


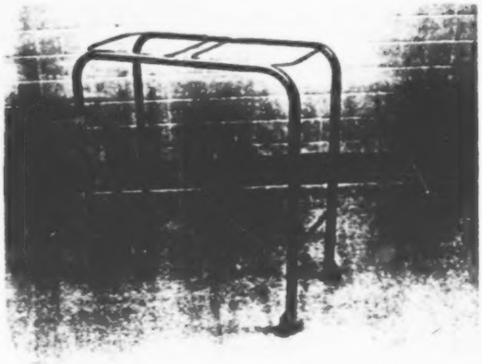


c. ______________________ d. ______________________

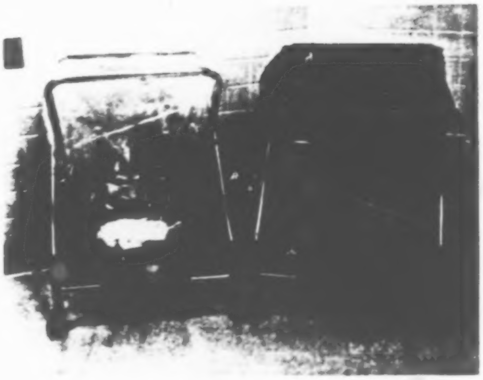
Written Test

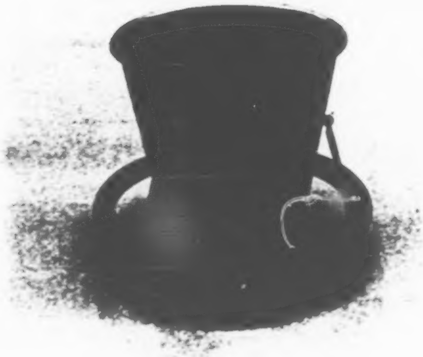
4. Identify the following furniture needed in each operating room.





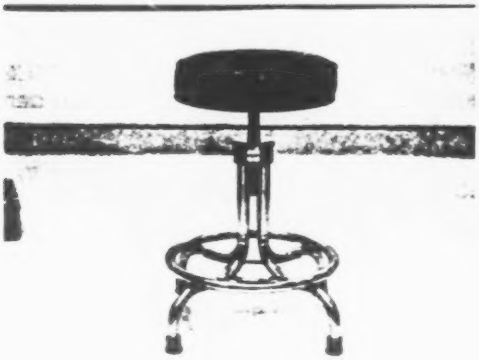
a. ______________________ b. ______________________

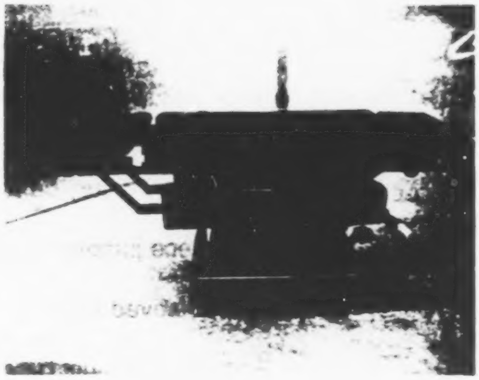




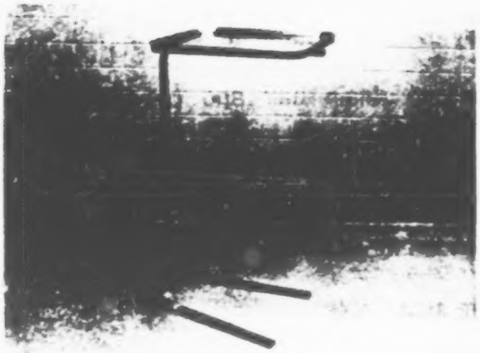
c. ______________________ d. ______________________

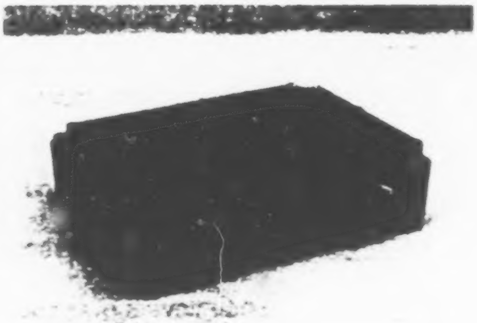
Written Test





e. ______________________ f. ______________________





g. ______________________ h. ______________________

Written Test

5. Select true statements concerning the components of operating room attire by placing a "T" or "F" next to the true or false statements.

_______a. Body covers must fit the body loosely.

_______b. Pants or trousers should have drawstrings around the waist and snug-fitting ankle cuffs to prevent shed of microorganisms from the perineal area and legs.

_______c. Scrub shirts must be tucked in or be tight fitting around waistline.

_______d. One-piece jumpsuits are clumsy and should not be worn.

_______e. Short-sleeved tops should never by worn by scrub personnel.

_______f. Body covers must be changed at least four times a day.

_______g. Body covers should be laundered by the hospital's laundry facilities.

_______h. Masks must be worn at all times within the hospital.

_______i. Protective eyewear must be approved shields or goggles.

_______j. Masks must be worn loosely over the mouth and nose.

_______k. Head covers must fit well to retain hair and prevent escape of microorganisms.

_______l. The head cover should be donned after the scrub suit or dress.

_______m. Tennis shoes are recommended for use in the operating room.

_______n. Shoe covers over shoes are acceptable.

_______o. Sterile scrub attire consists of a lab coat and gloves.

_______p. Sterile scrub attire is worn over scrub attire and hands to permit the wearer to create and come in contact with the sterile field.

_______q. Protective eyewear should be worn whenever activities place one at risk for a splash to the face or eye.

_______r. Gloves must be worn at all times, regardless of the task.

Written Test

6. State two purposes of operating room attire.

   a. ____

   ____

   b. ____

   ____

7. Select criteria for operating room attire by placing an "X" in the appropriate blanks.

   ______a. Must provide effective barrier to microorganisms

   ______b. Must be made of cotton

   ______c. Must be designed for maximum skin coverage

   ______d. Should be hypoallergenic, cool, and comfortable

   ______e. Should not produce lint

   ______f. Should be pliable enough to provide freedom of movement

   ______g. Must be made of wool or cotton

   ______h. Should be white to make easier to clean

   ______i. Should be difficult to remove

8. Select true statements concerning general considerations of operating room attire by placing a "T" or "F" next to the true or false statements.

   ______a. Every operating room department has its own policies regarding OR attire which should be strictly followed.

   ______b. Street clothes may be worn inside the restricted area of the OR department if it looks clean.

   ______c. OR attire should not be worn outside the OR suite unless a clean, closed, knee-length lab coat is worn over the OR attire.

   ______d. OR attire should be changed no more than twice a day.

   ______e. Head covers, masks, and shoe covers should be changed frequently throughout the day, especially after becoming torn, wet, or soiled.

   ______f. Never let mask dangle around the neck during break time. Discard it and don a new one when returning to the operating room.

   ______g. Costume jewelry is acceptable attire in the operating room suite.

Written Test

9. Complete the following statements concerning personal health and hygiene.

   a. Every person entering the operating room must be clean and healthy. Personal hygiene includes:

      (1) ______________________________

      (2) ______________________________

      (3) ______________________________

   b. Being in a state of optimum health enables the worker to function at his/her best. This includes:

      (1) ______________________________

      (2) ______________________________

      (3) ______________________________

   c. No person with ________________ will be permitted within the OR suite.

   d. Persons with cuts, burns, poison ivy, and other skin wounds will not be allowed to ________________ or handle sterile equipment.

***Permission to duplicate this test is granted.**

Operating Room Environment
Unit 4-A

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Complete a Worksheet Concerning the Hospital and Operating Room Environment Rating _____

Comments: ____

____

Assignment Sheet 2—Evaluate Your Personal Health and Hygiene Rating _____

Comments: ____

____

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ____

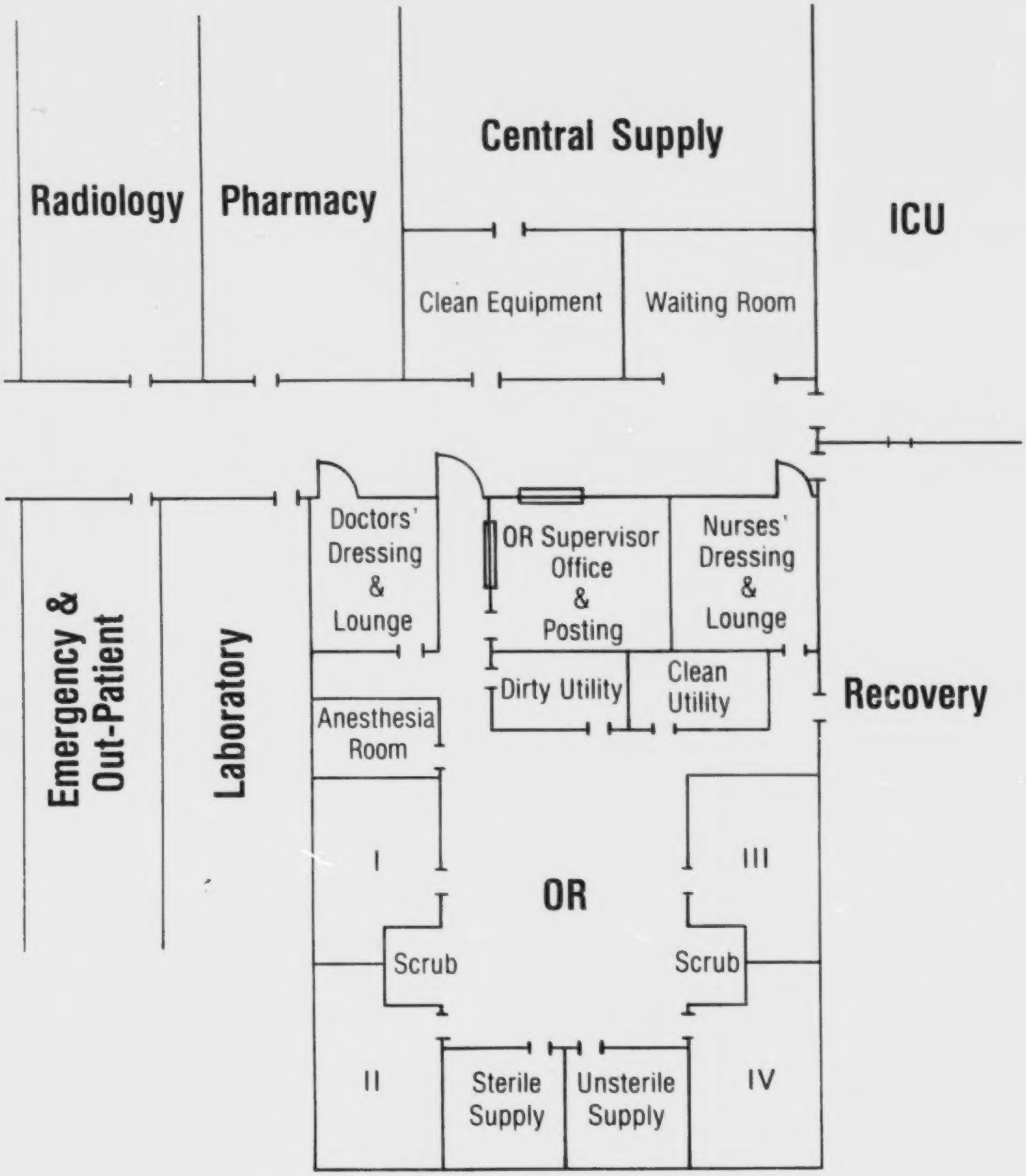
____

Teacher Signature ______________________________ Date __________

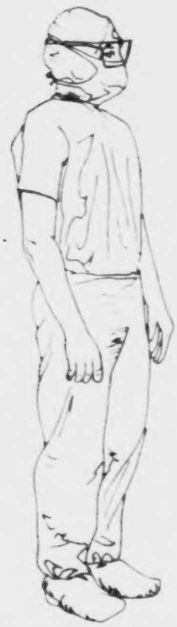
Student Signature ______________________________ Date __________

*Permission to duplicate this form is granted.

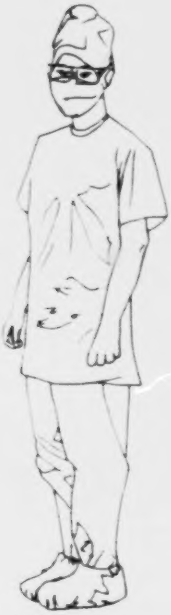
Operating Room Suite


Radiology
Pharmacy
Central Supply
ICU
Clean Equipment
Waiting Room
Emergency & Out-Patient
Laboratory
Doctors' Dressing & Lounge
OR Supervisor Office & Posting
Nurses' Dressing & Lounge
Recovery
Dirty Utility
Clean Utility
Anesthesia Room
I
III
OR
Scrub
Scrub
II
Sterile Supply
Unsterile Supply
IV

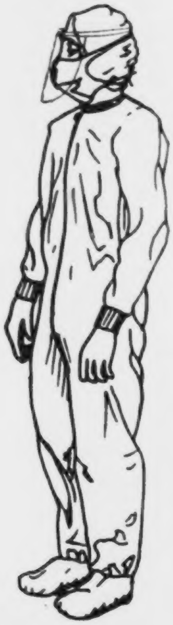
Types of Body Covers



Shirt and Trousers

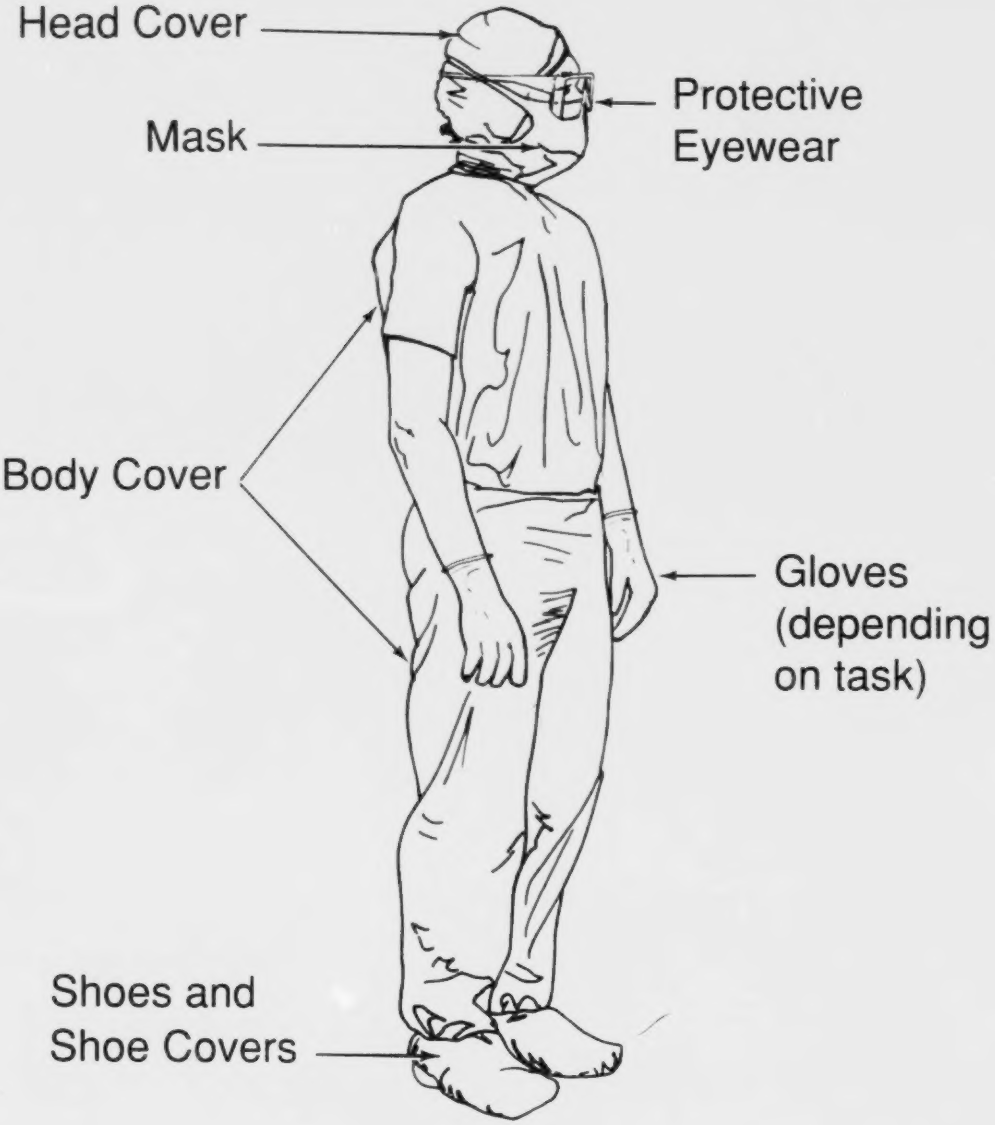


Pantsuit



Jumpsuit

Components of Operating Room Attire


Head Cover
Protective Eyewear
Mask
Body Cover
Gloves (depending on task)
Shoes and Shoe Covers

Surgical gowns and gloves to be worn over the above attire will be discussed in a later unit.

Operating Room Environment
Unit 4-A

Information Sheet

Note: The information in this unit is based on common policies and procedures. For specific information about local hospitals and medical centers, check with their "Policy and Procedure" manuals.

1. **Physical layout of the operating room (OR) suite** (Figure 1)

    a. Each medical facility plans its operating room suite based on the needs determined by the surgeons, OR supervisors, and administrative personnel.

    b. The number of operating rooms required in the operating room suite is determined by the following factors:

        (1) The number of beds in the hospital

        (2) The number and length of operations to be performed

        (3) The types of surgeries to be performed

        (4) The number of surgeons operating in that hospital and their distribution by specialty

    c. The OR suite should *ideally* be located near several ancillary units:

        (1) Central service

        (2) Laboratory (pathology)

        (3) Radiology (x-ray)

        (4) Preanesthesia holding room

        (5) Post anesthesia recovery (PAR) or recovery room (RR)

        (6) Blood bank

        (7) Intensive care unit (ICU)

        (8) Pharmacy

        (9) Emergency room

        (10) Out-patient, ambulatory, or same day surgery

        (11) Cardiac lab

Information Sheet

d. The OR suite is located so as to exclude outside traffic.

e. The OR suite is divided into restricted and unrestricted areas.

f. The OR suite is physically isolated or set away from the rest of the hospital.

g. The OR suite usually contains an elaborate system of corridors to control traffic and to separate sterile and unsterile areas.

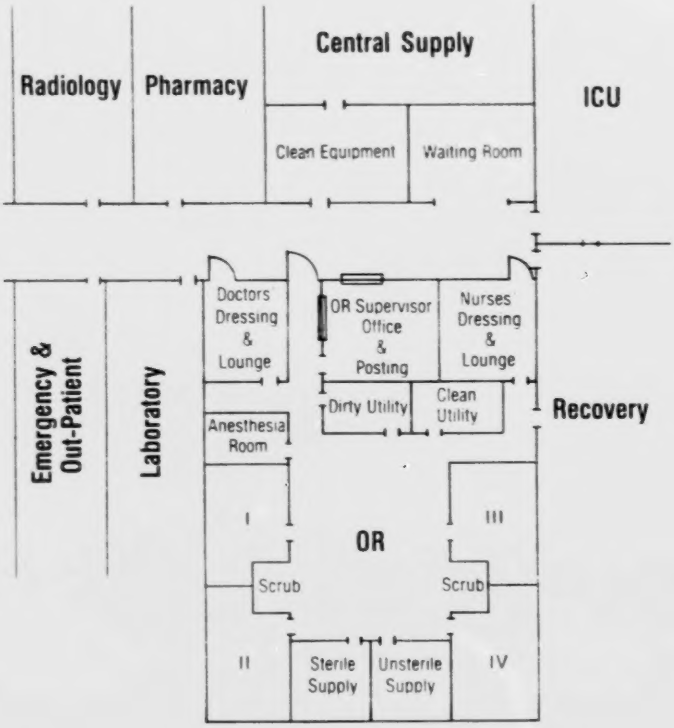
h. The OR suite is divided into two functional areas:

  (1) Procedure area for surgical treatment of patients

  (2) Area for storage and supportive activities

i. The size of operating rooms vary, but they must be large enough to accommodate comfortably the surgical team, the patient, and the furniture and equipment necessary for the surgical procedure.

Figure 1


Radiology
Pharmacy
Central Supply
ICU
Clean Equipment
Waiting Room
Emergency & Out-Patient
Laboratory
Doctors Dressing & Lounge
OR Supervisor Office & Posting
Nurses Dressing & Lounge
Dirty Utility
Clean Utility
Recovery
Anesthesia Room
I
OR
III
Scrub
Scrub
II
Sterile Supply
Unsterile Supply
IV

Information Sheet

2. **Areas in the operating room (OR) suite** (Figure 1)

   a. Restricted areas

      Note: These are open only to authorized personnel in proper OR attire.

      (1) Operating rooms

      (2) Scrub areas

         Note: One scrub area is supplied for every one or two operating rooms.

      (3) Supply and storage rooms

         (a) Unsterile supply room for solutions, specimen cups, and other unsterile supplies.
         (b) Sterile supply room for instruments, packs, and other sterile supplies.

      (4) Equipment (storage) room

      (5) Utility room

         (a) Clean
         (b) Dirty

      (6) Instrument room

         Note: This is for the storage of sterile instruments.

      (7) Anesthesia room

         Note: This includes the office and storage area for anesthesia supplies.

      (8) Clean linen room

      (9) Dark room

         Note: This is used to develop X-rays.

Information Sheet

b. Unrestricted areas

(1) Preanesthesia holding area

Note: This is used for holding patients before they are admitted to the individual operating rooms. This area may be restricted in some hospitals.

(2) Soiled laundry room

(3) Clean-up room

Note: This contains mops, buckets, hoppers, and other clean-up supplies.

(4) Cast room

(5) Rest rooms

(6) Dressing rooms

(a) Surgeons
(b) Women
(c) Men

(7) Lounge area

Note: This may be a restricted area in some hospitals.

(8) Classroom or conference room

(9) Offices for director or supervisor and secretary

Note: This office should be centrally located so both inside surgery personnel and outside hospital personnel can have access to it. If this is not possible, there must be one office within the OR suite and one office outside the suite.

(10) Posting and scheduling office

Note: This office is for the scheduling of OR cases. These cases must be scheduled by the surgeon or by the surgeon's office nurse. The hospital floor nurse cannot schedule an operation for a doctor.

Information Sheet

3. Equipment needed in each operating room

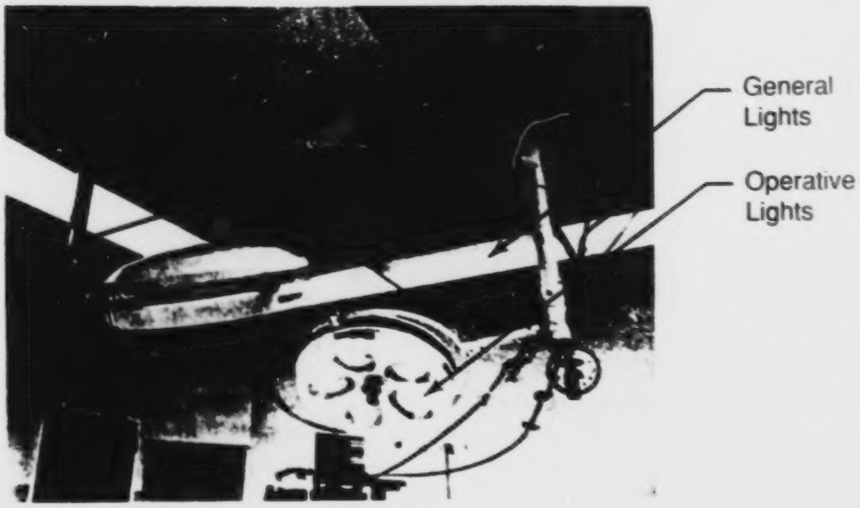
a. Lighting devices

(1) General illumination room ceiling lights

(2) Adjustable overhead operative lights (spot lights)

Note: Most overhead lights have handles which can be sterilized and covered so the surgical team can adjust them.

Figure 2



Information Sheet

b. Communication devices — Telephone, intercom, computer

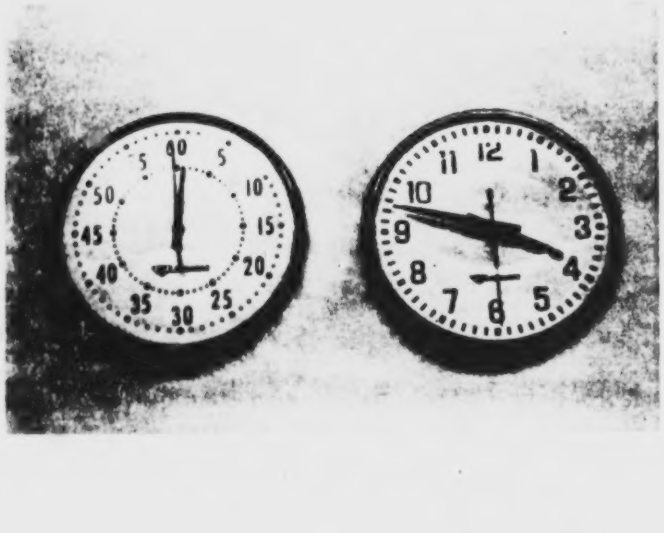
Note: These facilitate intra- and interdepartmental communication and minimize traffic into and out of the operating room.

Figure 3

c. Clocks and timers

Note: These are necessary to time tourniquet applications, cardiac arrests, and medications' duration, as well as other events that need to be timed.

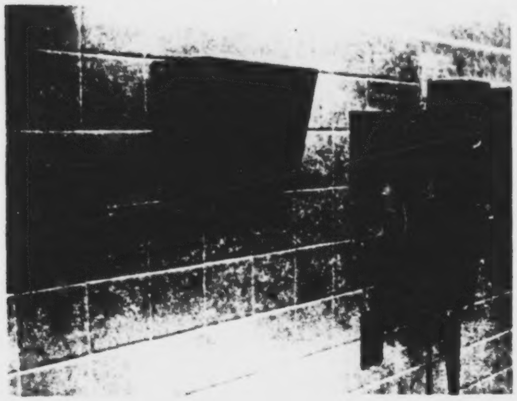
Figure 4



Information Sheet

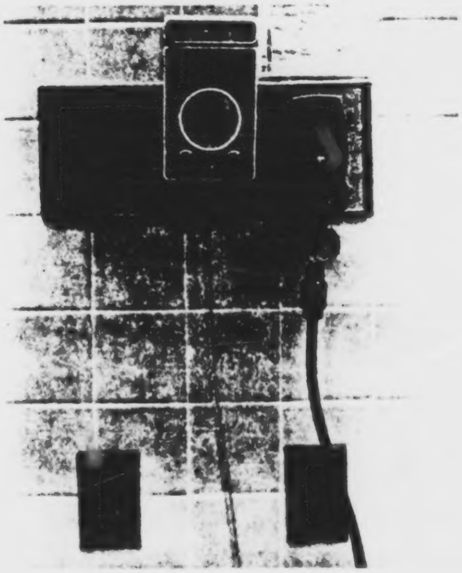
d. Special light switches and wall outlets

Figure 5



e. Outlets for suction and power equipment

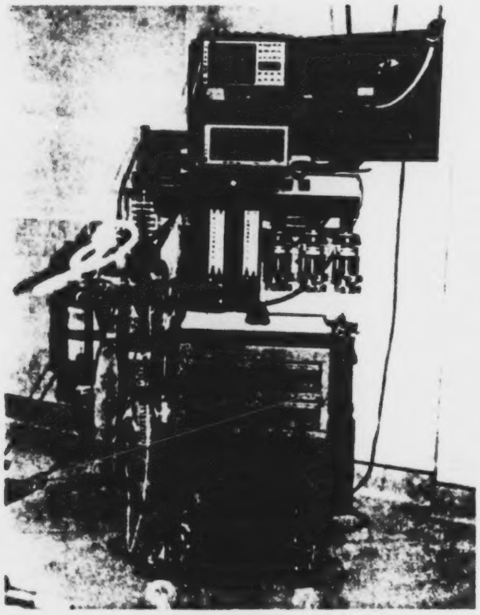
Figure 6



Information Sheet

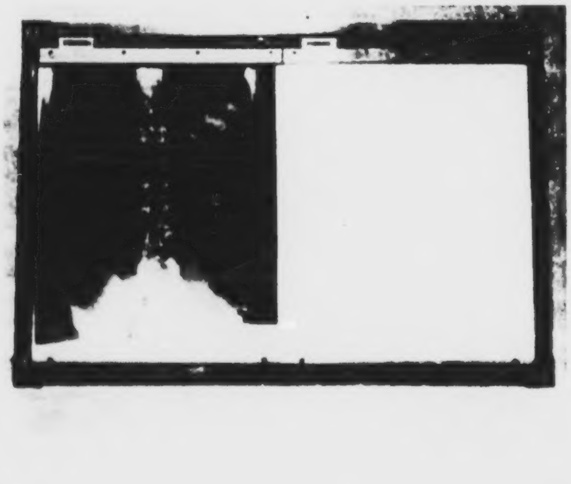
f. Anesthesia equipment and monitors

Figure 7



g. X-ray illuminating light

Figure 8



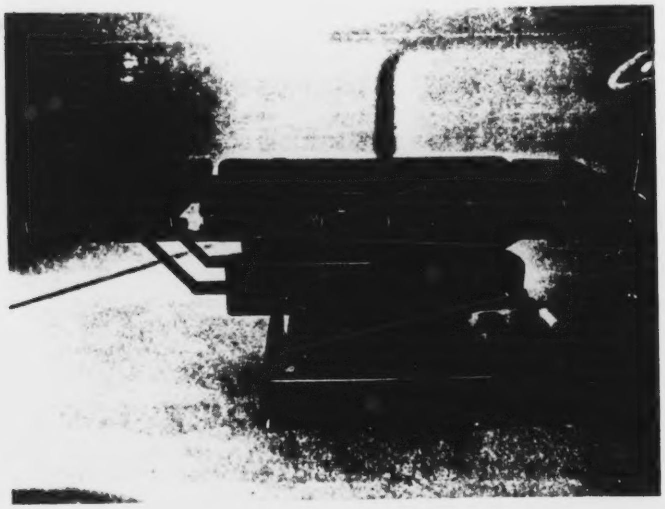
Information Sheet

4. Furniture needed in each operating room

a. Adjustable operating table

Note: The operating table will accept several accessories such as anesthesia screen, braces, foot rest, arm boards, and knee straps.

Figure 9

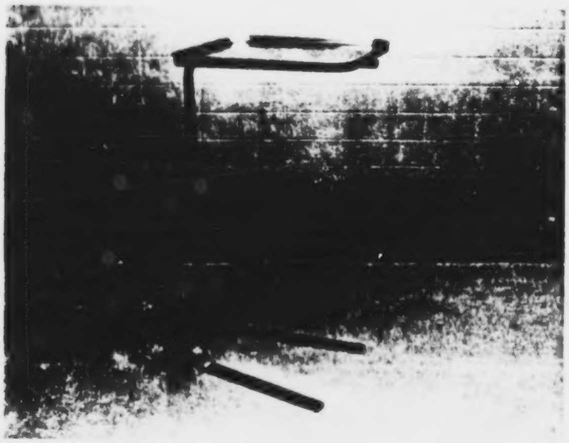


Information Sheet

b. Mayo stand

Note: This is draped and holds the frequently-used sterile instruments of a case.

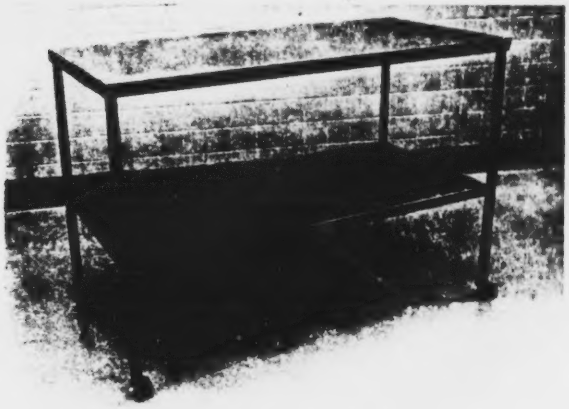
Figure 10



c. Back table

Note: This holds the extra sterile supplies and equipment of a case.

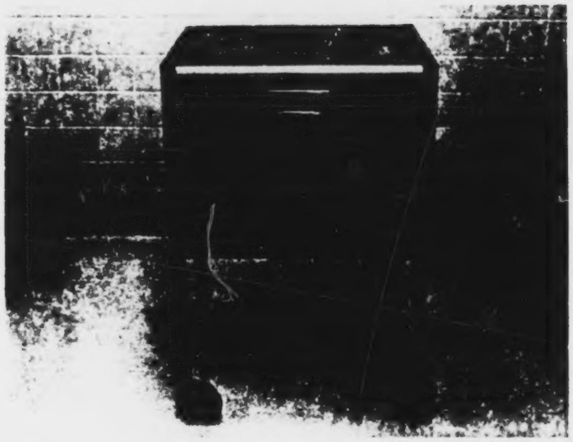
Figure 11



Information Sheet

d. Prep table

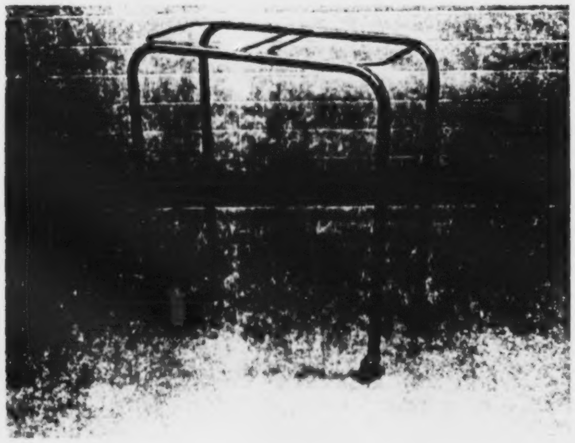
Figure 12



e. Ring stands (single and/or double)

Note: Ring stands hold the basins containing sterile water or saline used during surgery.

Figure 13



Information Sheet

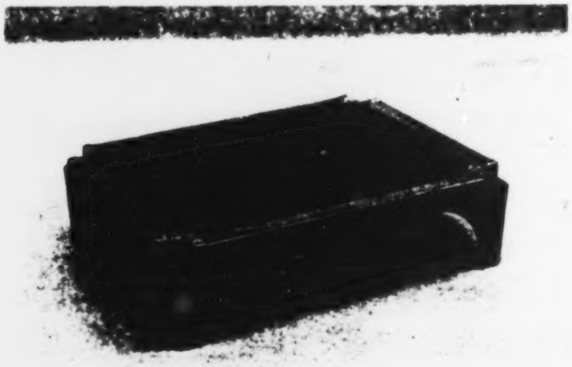
f. Kick bucket

Note: This is used only for soiled sponges.

Figure 14

g. Foot stools, platforms, or lift

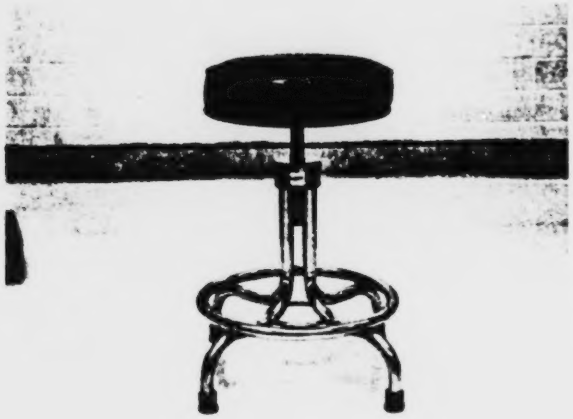
Figure 15



Information Sheet

h. Sitting stool

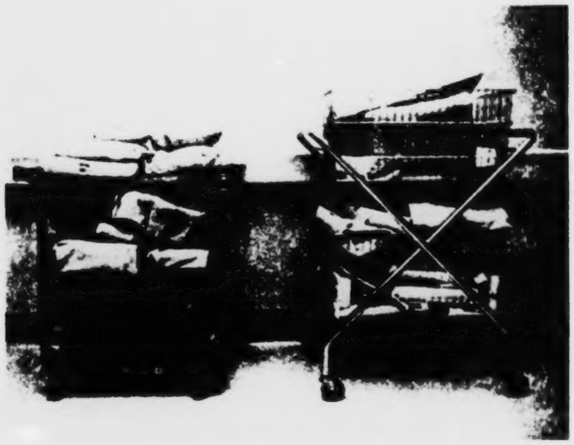
Figure 16



i. Case carts (open or closed)

Note: These are used in some hospitals to pull supplies in advance of planned cases.

Figure 17

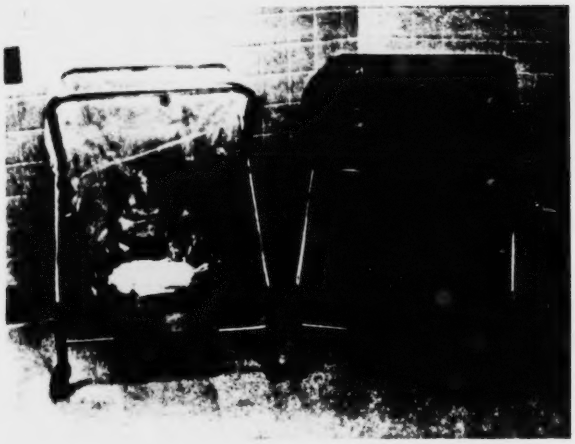


Information Sheet

j. Linen hamper

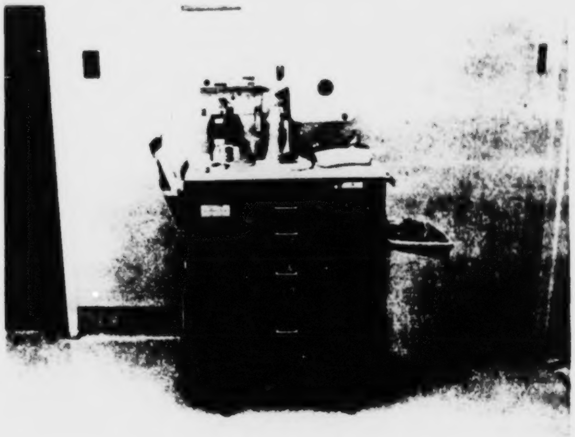
k. Trash container

Figure 18



l. Anesthesia cart

Figure 19

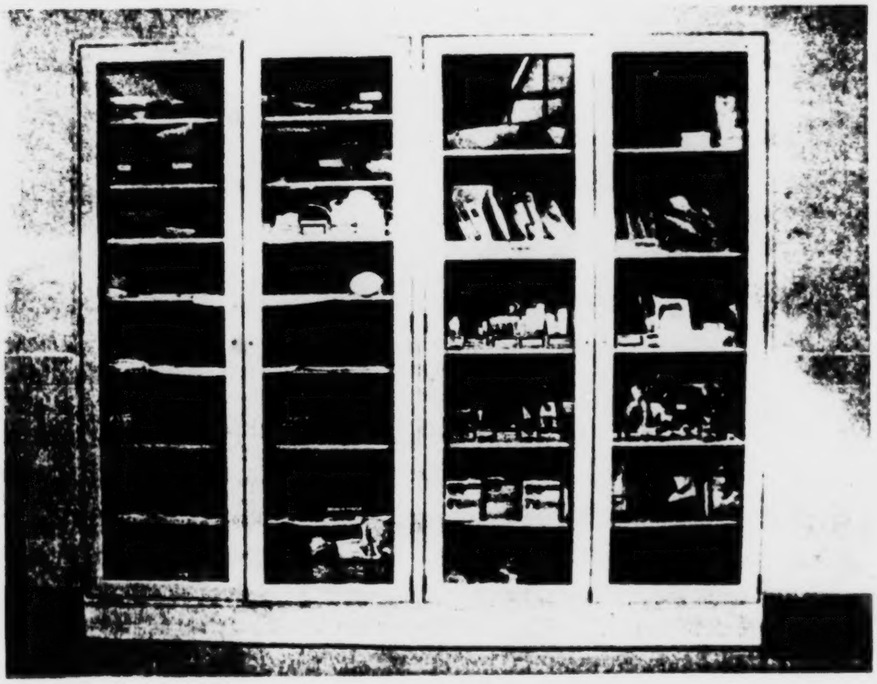


Information Sheet

m. Closed supply cabinets

Note: These are used for extra supplies that are commonly used. The doors on them help to prevent dust accumulation.

Figure 20

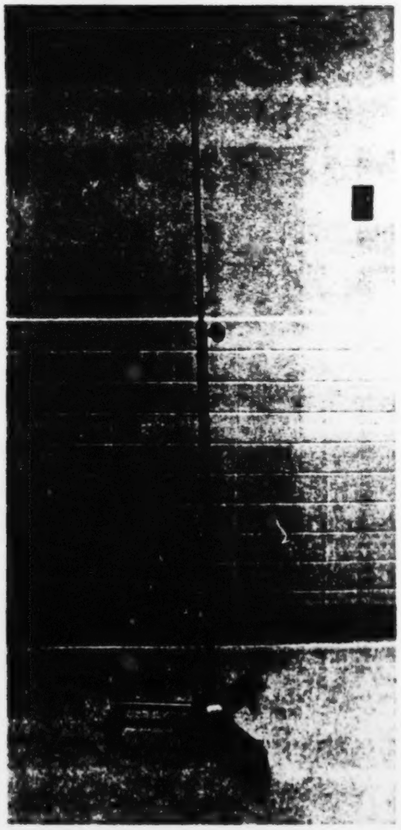


BEST COPY AVAILABLE

Information Sheet

n. I.V. poles (at least two)

Figure 21



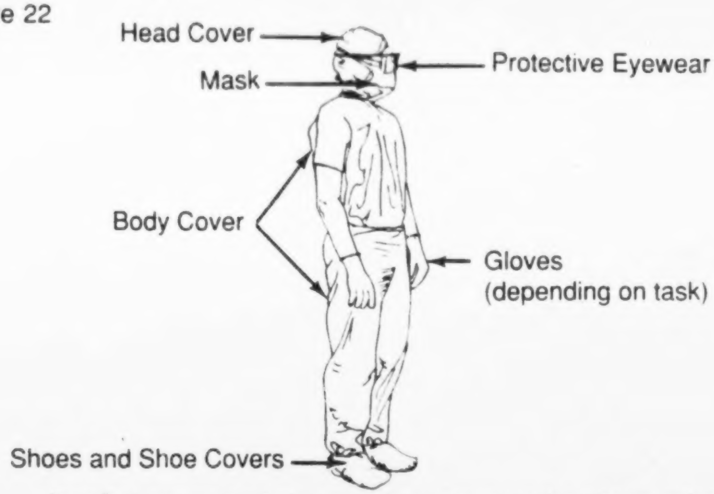
Note: There are many other pieces of equipment and furniture used in surgery, but not all are required in *every* operating room. These will be covered in MAVCC's *Surgical Techniques*.

Information Sheet

5. Components of operating room attire

Note: The specific operating room attire required in local medical facilities should be discussed in their "Policy and Procedure" manual.

Figure 22


Head Cover
Protective Eyewear
Mask
Body Cover
Gloves (depending on task)
Shoes and Shoe Covers

Surgical gowns and gloves to be worn over the above attire will be discussed in a later unit.

a. **Head covers**

(1) Hair is grossly contaminated with bacteria and is a source of electrostatic sparks. Therefore, all head and facial hair must be covered in the restricted area of the operating room.

(2) A variety of disposable lightweight caps, hoods, turbans, or helmets are available for this purpose.

(3) Head covers must fit well to retain hair and prevent escape of microorganisms.

(4) The head cover should be donned before the scrub suit to prevent contamination of the garment by fallout from the hair.

(5) Change head cover as often as necessary.

Information Sheet

b. **Protective eyewear**

(1) Should be worn whenever activities place one at risk for a splash to the face or eye

(2) Is worn over personal corrective eyeglasses

(3) Must be approved shields or goggles

Note: Some manufacturers make a full-face protection device that consists of an eye shield attached to the upper edge of a mask.

c. **Masks**

(1) Are worn to contain and filter out microorganisms from the mouth, nose, and respiratory tract

(2) Must be worn at all times within the operating room

(3) Must be worn snugly over mouth and nose; tie upper strings at back of head, and tie lower strings behind neck.

Note: If the mask is worn loosely, expired air escapes around the edges into the room.

(4) Reusable cotton masks are now obsolete; disposable masks are more efficient in filtering microorganisms.

(5) Handle the mask by the strings, but do not handle excessively.

(6) Do not handle a contaminated mask with bare hands; remove by the strings and discard in trash basket.

(7) Never let mask loosely dangle around neck.

(8) Change mask after each case; do not permit mask to become wet.

(9) Keep talking, coughing, and sneezing to a minimum as this increases the bacteria forced into the air.

d. **Body covers such as jumpsuit, pantsuit, or shirt and trousers**

(1) Must fit the body closely.

(2) Must be changed daily or more often, if necessary.

(3) Should be laundered by the hospital's laundry facilities

Information Sheet

(4) Pants or trousers should have drawstrings around the waist and snug-fitting ankle cuffs to prevent shed of microorganisms from the perineal area and legs.

(5) Scrub shirts must be tucked in or be tight fitting around waistline.

(6) One-piece jumpsuits are convenient for visitors such as pathologists.

(7) Short-sleeved tops are required for scrub personnel.

e. Gloves

(1) Are worn whenever there is possible contact with blood or body fluids

(2) Are changed after contamination. Hands must be washed after removing gloves.

(3) Sterile (surgical) gloves are required when performing sterile procedures.

(4) Unsterile (utility) gloves are worn for nonsterile tasks.

f. Shoes and shoe covers

(1) Shoes should be easy to clean, comfortable, and supportive of the feet.

Note: Clogs are considered a safety hazard, sandals do not support feet well, and tennis shoes are difficult to clean after becoming soiled with blood. Canvas shoes do not provide adequate protection. Therefore, these types of shoes are not worn in the operating room.

(2) Shoes must be kept clean as they may provide a place for bacterial growth.

(3) Blood and soil must be removed from the shoes by mechanically scrubbing with a soap solution. They should be cleaned daily.

(4) Shoes restricted to wear in the OR suite or shoe covers over shoes aid in reducing microbial transfer from the outside into the OR.

(5) Shoe covers serve a number of purposes.

- (a) Provide a method of preventing cross-contamination of microorganisms when changed regularly.
- (b) Help prevent contamination of shoes by blood and soil.

Information Sheet

g. **Sterile scrub attire**

(1) Sterile scrub attire consists of a sterile gown and sterile gloves.

(2) Sterile gown and gloves are worn over scrub attire and hands to permit the wearer to create and come in contact with the sterile field.

(3) The gown and gloves are made of materials which provide effective barriers for the practice of aseptic technique.

Note: Specific instruction will be given in MAVCC's *Surgical Techniques* regarding the actual donning of sterile gowns and gloves using aseptic technique.

6. **Purposes of operating room attire**

a. To provide barriers that prevent spread of microorganisms to patient

b. To protect surgery personnel (from the patient and from each other)

c. To protect the patient (from the surgery personnel and from himself/herself)

d. To prohibit contamination of the sterile field and operative wound by direct body contact

7. **Criteria for operating room attire**

a. Must provide effective barrier to microorganisms

b. Garment must meet National Fire Protection Association Standards (NFPA-5C A)

c. Must be designed for maximum skin coverage

d. Should be hypoallergenic, cool, and comfortable

e. Should not produce lint

f. Should be pliable enough to provide freedom of movement

g. Should be able to transmit heat and water vapor to protect the wearer

h. Should be colored to reduce glare

i. Should be easy to don and remove

Note: In 1991, the Association of Operating Room Nurses (AORN) published the *Standards for O.R. Attire.* These standards are very closely adhered to in hospitals across the United States and some other countries in the world.

Information Sheet

8. General considerations of operating room attire

a. Every operating room department has its own policies regarding OR attire which should be strictly followed.

b. Street clothes are never worn inside the restricted area of the OR department.

c. OR attire should not be worn outside the OR suite unless a clean, closed, knee-length lab coat is worn over the OR attire.

d. OR attire must be changed if it is wet or grossly soiled.

e. Showers are available in case of gross contamination during a procedure.

f. Head covers and shoe covers should be changed frequently throughout the day, especially after becoming torn, wet, or soiled.

g. Masks should be changed after each procedure

h. Never let mask dangle around the neck during break time. Discard it and don a new one when returning to the operating room.

i. No costume jewelry should be worn in the operating room suite.

9. Personal health and hygiene

a. Every person entering the operating room must be clean and healthy. Personal hygiene includes:

  (1) A daily bath and using deodorant

  (2) Skin in good condition

  (3) Hair that is clean, controlled, and free of dandruff

  (4) Daily oral hygiene

  (5) Clean, short nails without nail polish

b. Being in a state of optimum health enables the worker to function at his/her best. This includes:

  (1) Sufficient rest and sleep

  (2) Proper exercise

  (3) Avoidance of undue fatigue and stress

  (4) No excessive use of alcohol, tobacco, or drugs

Information Sheet

c. No person with an acute infection or symptoms of a communicable disease will be permitted within the OR suite.

Note: Medical facilities must adhere to CDC and OSHA standards to prevent the transmission of disease.

d. Persons with cuts, burns, poison ivy, and other skin wounds will not be allowed to scrub or handle sterile equipment.

Operating Room Environment
Unit 4-A

Student Supplement 1—Complete Statements Concerning the Operating Room Environment

Name ______________________________ Date ______________

Directions: Complete the following statements by placing the correct letters in the blanks provided.

_______ 1. The purpose of covering OR attire when leaving the operating room suite is:

- a. So visitors in the hospital won't view debris on the attire
- b. To minimize cross-contamination between the operating room and other areas of the hospital
- c. To keep personnel warm
- d. To keep OR attire dry

_______ 2. The purpose of wearing scrub clothing in the OR is to:

- a. Provide for standardization of uniforms
- b. Prevent staining and contamination of personnel clothing
- c. Provide personal comfort for personnel
- d. Prohibit contamination of the sterile field and operative wound

_______ 3. While a surgical case is in progress:

- a. Doors remain open so staff can easily move in and out
- b. Doors should remain closed
- c. Doors remain open to circulate air
- d. Doors may be opened or closed

_______ 4. If you have been assigned to scrub for a procedure and you have a cut on your hand, you should:

- a. Use more detergent when scrubbing
- b. Scrub five minutes extra
- c. Put a bandage over the cut
- d. Show the cut to your instructor or supervisor

_______ 5. Good general health and personal cleanliness of personnel in the OR are an important part of:

- a. Nosocomial infections
- b. Aseptic technique
- c. Septic cases
- d. Universal Precautions

Student Supplement 1

_______ 6. Jewelry should be prohibited in the OR because:

- a. It can scratch a patient
- b. It can catch on OR equipment
- c. It is a reservoir for bacteria
- d. All of the above

_______ 7. The only personnel allowed in the restricted area of a operating room are:

- a. Authorized personnel in street attire
- b. Authorized personnel in street or scrub attire
- c. Anyone who would like to observe the operating room
- d. Authorized personnel in proper OR attire

_______ 8. A surgical mask:

- a. Must be worn loosely over the mouth and nose
- b. Must be worn at all times within the operating room
- c. May be removed in the operating room during the procedure
- d. May be removed as soon as the dressing is on the patient

_______ 9. Masks are vital to the prevention of infection. Masks:

- a. Are not necessary in an operating room when no case is in progress
- b. May dangle below the chin when you are taking a break
- c. Guard against transmission of infection when the scrub nurse has an infection
- d. Must be changed between cases

_______10. It is considered good technique to:

- a. Change the mask only if it becomes moistened
- b. Hang the mask around the neck
- c. Wear mask loosely over the mouth and nose
- d. Handle the mask only by the strings

_______11. The proper way to remove a surgical mask after surgery is:

- a. To remove it by grasping the whole mask
- b. To remove it by the strings and discard in the trash container
- c. It doesn't matter how you take it off
- d. Leave it on for the next procedure

Student Supplement 1

_______12. Which of the following are no longer acceptable for use in OR because they have a very low filtration efficiency?

a. Shoe covers
b. Cloth masks
c. Paper gowns
d. Paper drapes

_______13. A surgical head cover (cap or hat) is put on:

a. Before the OR suit
b. After the OR suit
c. When the OR suite is entered
d. Before leaving the OR area

_______14. Surgical masks should be changed:

a. After each case
b. Daily
c. Twice a day
d. Every two hours

_______15. When changing into operating room attire, the first item donned should be:

a. Scrub pants
b. Surgical head cover
c. Scrub top
d. Shoe covers

_______16. All of the following statements concerning OR attire are true, EXCEPT:

a. OR attire must be clean and laundered by the hospital laundry
b. All personnel entering the restricted area should be wearing OR apparel
c. OR attire protects the surgery personnel and the patient
d. OR attire must be changed between each surgical case

_______17. When a staff member leaves the OR suite, the lab coat worn over the OR attire should be:

a. Clean, closed, and knee-length
b. Changed upon re-entry to the OR
c. Laundered before entry into the OR suite
d. Clean, open, and knee-length

Operating Room Environment
Unit 4-A

Assignment Sheet 1—Complete a Worksheet Concerning the Hospital and Operating Room Environment

Name ____________________ Overall Rating __________

Evaluation criteria	**Rating**
Questions are answered correctly	______
Descriptions use correct grammar, punctuation, and spelling	______

Directions: After taking a tour of a local hospital or medical center, answer the following questions.

A. Layout of hospital

1. What departments are directly connected with the operating room suite?

____

____

____

2. What departments are near but not directly connected to the operating room suite?

____

____

____

____

Assignment Sheet 1

B. Areas of the operating room suite

1. What areas of the operating room suite are unrestricted?

2. What areas of the operating room suite are restricted?

3. What is the hospital's procedure for entering restricted areas?

4. Is this procedure given to new employees or students in written form, oral form, or both? (Circle one)

5. Are family members every allowed in restricted areas? ____________

   If yes, in what cases or under what circumstances? ____________

Assignment Sheet 1

C. Operating room equipment and furnishings

1. What equipment is included in each operating room?

2. What furnishings (furniture) are included in each operating room?

D. OR attire

1. What type of attire is worn by operating room personnel?

2. What options, if any, are available for the types of body covers?

Assignment Sheet 1

3. Where is clean, operating room attire located? ____________________

____

____

4. What is the procedure for donning it? (Where, when, sequence)

Note: Do not include the procedure for surgical attire. This will be covered later.

____

____

5. What is the procedure for disposing of operating room attire? __________

____

____

Operating Room Environment
Unit 4-A

Assignment Sheet 2—Evaluate Your Personal Health and Hygiene

Name ______________________________ Overall Rating __________

Evaluation criteria	Rating
Questions are answered and rated	_____
Ratings are totaled	_____

Directions: Evaluate yourself on each of these questions using the following scale:

6 — Always
4 — Usually
2 — Occasionally
0 — Never

Total your score and compare to the rating scale provided.

QUESTIONS	RATING
1. Do you take a bath or shower daily?	_____
2. Do you use an effective deodorant or antiperspirant daily?	_____
3. Do you shave as often as needed?	_____
4. Do you clean your face daily (more often if necessary)?	_____
5. Do you check your fingernails daily and repair or trim as necessary?	_____
6. Do you wash your hair twice weekly (more often if necessary)?	_____
7. Do you have your hair cut or trimmed regularly?	_____
8. Do you use a dandruff shampoo and/or creme rinses and conditioners if needed?	_____
9. Do you brush your teeth at least twice daily?	_____
10. Do you use a mouthwash daily?	_____
11. Do you put on clean clothes and undergarments daily?	_____
12. Do you get enough sleep and rest so that you feel refreshed?	_____
13. Do you eat nutritious foods in the proper amounts (not too much or too little) to maintain your stamina and energy level?	_____

Assignment Sheet 2

QUESTIONS	RATING
14. Do you devote time at least three times each week to sustained exercise?	______
15. Do you regularly participate in activities or hobbies as pure recreation (for personal fun)?	______
16. Do you avoid the use of alcohol, tobacco, and drugs?	______
TOTAL	______

RATING SCALE		
96 — 90	Great	You take pride in your appearance.
89 — 83	Good	You'd probably pass inspection.
82 — 76	Fair	You're not really trying.
Less than 76	Poor	Your best friend won't even tell you.

Medical Terminology
Unit 1-B

Objective Sheet

Unit Objective

After completing this unit, the student should be able to identify root words, affixes, medical abbreviations, and medical terms. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the unit test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to medical terminology with their correct definitions.
2. Complete statements concerning medical terminology pronunciation hints and applications.
3. Select true statements concerning rules for forming plurals.
4. Complete a chart of prefixes and their meanings.
5. Complete a chart of root words and their meanings.
6. Complete a chart of suffixes and their meanings.
7. Write medical abbreviations for medical/surgical terms.
8. Match medical specialists with their correct descriptions.
9. Pronounce medical terminology. (Assignment Sheet 1)
10. Form plurals for medical terms. (Assignment Sheet 2)
11. Interpret medical terminology using root words and affixes. (Assignment Sheet 3)
12. Use medical terminology to identify medical conditions and procedures. (Assignment Sheet 4)

Medical Terminology
Unit 1-B

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make a transparency from the transparency master included with this unit. This appears in the teacher edition only and is designed to be used with the following objective:

   TM 1—Parts of a Word (Objective 1)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheets. Review criteria for evaluation of these activities.

12. Discuss the student supplements. These could be used as homework assignments, daily practice exercises, or quizzes. Explain to students how you plan to evaluate the supplements, if at all.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Add any additional assignments or supplemental activities that should be part of the unit evaluation.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Make flash cards of root words, prefixes, suffixes, abbreviations, and medical terms. This activity will reinforce **visual learning, foundation reading, oral and communication, self-esteem**, and **teamwork skills**.

2. Have students make a game like Jeopardy using medical terms, rules for forming plurals, prefixes, suffixes, root words, and abbreviations. This will enhance **creative thinking, problem solving, teamwork, leadership**, and **communication skills**.

3. Develop crossword puzzles to assist in learning roots, prefixes, and suffixes for medical terminology. Several computer software programs are available to make crossword puzzles. Puzzles reinforce **creative thinking, problem solving, motivation**, and increase **self-esteem** when the puzzles are completed.

4. Stress to students the importance of learning root words and affixes in order to build a working medical vocabulary. Have students practice with partners on pronunciation of medical terms. This can assist students in recognizing proper usage in their work and others. This activity will enhance **teamwork, interpersonal relations**, and **communication skills**.

5. Provide examples of surgery schedules or patient records (deleting names to ensure privacy) for students to practice interpreting medical abbreviations. This activity will increase **foundation** and **critical thinking skills**.

Suggested Activities

6. Discuss abbreviations used in local hospitals that may not be included in this unit. This activity helps to localize the information in the unit and can reinforce **communication, foundation reading and writing**, and **teamwork skills**.

7. You may want to use videocassette programs to reinforce the students' understanding of medical terminology. (Refer to "Suggested Supplemental Resources" for two programs.) These programs can enhance **communication, creative thinking, group effectiveness**, and **self-esteem** along with **foundation reading and writing skills**.

8. Provide dictionaries (standard and medical) that students can use in Assignment Sheets 1 and 2.

Resources Used in Developing This Unit

1. Smith, Genevieve L., et. al. *Medical Terminology*, 6th ed. Albany, NY: Delmar Publishers, Inc., 1991.

2. Gylys, Barbara A. and Mary Ellen Wedding. *Medical Terminology: A Systems Approach*, 2nd ed. Philadelphia: F. A. Davis Co., 1988.

3. Ehrlich, Ann. *Medical Terminology for Health Professions*. Albany, NY: Delmar Publishers, Inc. 1992.

Suggested Supplemental Resources

1. *Taber's Cyclopedic Medical Dictionary*, 16th edition. Copyright 1989

F. A. Davis Company	J. A. Majors Co.
1915 Arch Street	P.O. Box 82686
Philadelphia, PA 19103	Atlanta, GA 30354
ISBN 0-8036-8310-3	ISBN 0-8036-8311-1
(Indexed)	(Unindexed)

2. Medical Terminology Videotapes
Dean Vaughn Learning System DCM/Instructional Systems
80 Wilson Way
Westwood, MA 02090
(Workbook ISBN 0-914901-06-0)

Suggested Activities

3. *Medical Terminology Series* — 3 videocassettes including:
    a. *Introduction to Medical Terminology*, 20 min.
    b. *Spelling Medical Terminology*, 18 min.
    c. *Pronunciation of Medical Terminology*, 15 min.

    Available from:

    Health Sciences Consortium
    201 Silver Cedar Court
    Chapel Hill, NC 27514-1517
    919-942-8731

Medical Terminology
Unit 1-B

Answers to Student Supplements

Student Supplement 1

	PREFIXES	MEANINGS
1.	Retro	Backward, located behind
2.	Super	Above, upper, excessive
3.	Intro	Into, within
4.	Ab	Away from
5.	Infra	Underneath, below
6.	Ecto	On outer side, exterior
7.	Gravis	Heavy
8.	Crypto	Hidden, concealed
9.	Ante	Before, forward
10.	Para	Beside, beyond, near to
11.	Pre, pro	Before, in front of
12.	Pseudo	False
13.	Semi, hemi	Half
14.	Dys	Bad, painful, difficult, disordered
15.	Bi	Twice, double
16.	Meso	Middle, mid
17.	Sclero	Hard
18.	Xero	Dry
19.	Py	Pus
20.	Mono	One, single, limited to one part
21.	Neo	New
22.	Sub	Under
23.	Glyco	Sugar, sweet
24.	A, an	Without, lack of
25.	Epi	On, upon
26.	Thermo	Heat, warm
27.	Necro	Dead
28.	Ad	To, toward, near to
29.	Endo	Interior, within, inside
30.	Cryo	Cold
31.	Di, diplo	Twice, double
32.	Anti	Against, opposed to, reversed
33.	Multi or Poly	Many, much
34.	Steno	Narrow
35.	Contra	Against, opposite

Answers to Student Supplements

Student Supplement 2

	ROOT WORDS	MEANINGS
1.	Cysto	Sac, cyst, urinary bladder
2.	Cholecyst	Gallbladder
3.	Rhino	Nose
4.	Procto	Rectum
5.	Labio	Lips
6.	Vaso	Vessel or duct
7.	Nephro	Kidney
8.	Chole	Bile or gall
9.	Hydro	Water
10.	Pneumo	Lungs
11.	Osteo	Bone
12.	Myringo	Ear drum
13.	Dento or donto	Tooth
14.	Cordo	Cord
15.	Neuro	Nerve
16.	Linguo	Tongue
17.	Ano	Anus
18.	Oto	Ear
19.	Thoraco	Thorax or chest
20.	Cardi or cardio	Heart
21.	Lacrimo	Tears
22.	Phleb	Vein
23.	Col	Colon
24.	Encephalo	Brain
25.	Uretero	Ureter
26.	Urethro	Urethra
27.	Pleuro	Pleura of lung
28.	Dorso	Back
29.	Ophthalmo	Eye
30.	Gastro	Stomach
31.	Masto	Breast
32.	Gynec	Women
33.	Cost	Rib
34.	Hepato	Liver

Answers to Student Supplements

Student Supplement 3

	SUFFIXES	MEANINGS
1.	Oscopy	Creation of an artificial or new opening
2.	Rrhea	Flow, discharge
3.	Pexy	Fixation or suturing in place
4.	Graphy	Drawing, representing, recording, describing
5.	Stasis	Stop, stand still
6.	Itis	Inflammation of
7.	Algia	Pain
8.	Genesis	Produce, origin
9.	Tomy	Cut, incise
10.	Centesis	Puncture to aspirate
11.	Lithiasis	Pertaining to stones
12.	Ectomy	Surgical excision of
13.	Pathy	Disease
14.	Rrhagia	Burst forth, pour
15.	Ptosis	Fall, drooping
16.	Osis	Condition of, state caused by
17.	Gram	Something drawn or written
18.	Otomy	Incision into an organ or tissue
19.	Trophy	Nourish, nutrition
20.	Ology	Study or science of
21.	Oma	Tumor, swelling
22.	Lysis	Breaking up, freeing, dissolving
23.	Therap	Treat, cure
24.	Phobia	Fear
25.	Tome	A cutting instrument
26.	Orrhaphy	Repair of
27.	Plasty	Restoration of
28.	Thermy	Heat, use of heat
29.	Plegia	Paralyze
30.	Cele	Tumor; hernia

Student Supplement 4

1. CO_2
2. Electrocardiogram
3. CPR
4. With
5. ā
6. Cancer, carcinoma
7. Abd. hyst.
8. Benign prostatic hypertrophy

Answers to Student Supplements

9. BMR
10. Blood pressure
11. TUR, TURP
12. Mouth
13. M.D.
14. Gastrointestinal
15. IV
16. Prepare for, preparation
17. K
18. Left eye (oculus sinister)
19. PNS
20. After
21. NPO
22. White blood count
23. ♀
24. Streptococcus
25. q.d.
26. Milligram
27. Para I
28. Post-operative
29. $\bar{s}$
30. Rhesus blood factor
31. O_2
32. Gynecology
33. $\overline{ss}$
34. White blood cell
35. T & C
36. Weight
37. p.r.n.
38. Of each
39. AKA
40. Twice a day
41. CBC
42. Lateral
43. Hgb.
44. Intramuscular
45. D & C
46. Left lower lobe
47. P.I.D.
48. Right eye (oculus dexter)
49. V.S.
50. Right lower quadrant

Medical Terminology
Unit 1-B

Answers to Assignment Sheets

Assignment Sheet 1—Evaluated according to the stated criteria

Assignment Sheet 2

1. Metastases
2. Carcinomata
3. Vagi
4. Colostomies
5. Carinae
6. Bronchi
7. Septa
8. Leiomyomata
9. Ostia
10. Dentures
11. Corneae
12. Thromboses
13. Puncta
14. Herniae
15. Glomeruli
16. Bacteria
17. Cocci
18. Traumata or traumas
19. Fundi
20. Salpinges
21. Bacilli
22. Brachia
23. Sinuses
24. Cervices
25. Cilia
26. Conchae
27. Condyli
28. Vessels
29. Spermatozoa
30. Nares
31. Ligaments
32. Cholecystectomies
33. Laparoscopies
34. Hemorrhoidectomies
35. Fossage
36. Forceps
37. Diseases
38. Surgeries
39. Hemostats
40. Arteries

Assignment Sheet 3

1. Rhino/plasty — *Restoration of the nose*
2. Myo/cardia — *Heart muscle*
3. Oophoro/cyst ectomy — *Surgical excision of an ovarian cyst*
4. Hemi/col/ectomy — *Surgical excision of half of the colon*
5. Colp/oscopy — *Examination of the vagina with a scope*
6. Neo/natal — *New born*
7. Thermo/gram — *Drawing made by heat or showing heat*
8. Arterio/scler osis — *Condition of hard arteries*
9. Choledoch/ostomy — *Creation of a new common bile duct*
10. Dys/meno/rrhea — *Painful monthly discharge*
11. Hydro/phobia — *Fear of water*
12. Para/median — *Beside the middle*
13. Osteo/arthr itis — *Inflammation of a bone's joints*
14. Proct/ology — *Study of the rectum*
15. Dacryo/cyst/ectomy — *Surgical excision of a cyst in the tear duct (or sac)*

Answers to Assignment Sheets

16. Anti/coagulant — *Substance that opposes coagulation*
17. Bi/lateral — *Two or both sides*
18. Micro/organism — *Small organism*
19. Oto/rhino/laryng/ology — *Study of the ear, nose, and throat (larynx)*
20. Pyloric sten/osis — *Condition of narrowing at the pylorus*

Assignment Sheet 4

1. Cholecystitis
2. Cervicitis
3. Endocarditis
4. Hematoma
5. Hyperemia
6. Hysterectomy
7. Lipemia
8. Cholelithiasis
9. Myoma
10. Ophthalmologist
11. Osseous
12. Gastroenterostomy
13. Parahepatic
14. Proctoplasty
15. Psychopathology
16. Gastroscope
17. Cardiomegaly
18. Blepharospasm
19. Gastrostomy
20. Hemolysis

Medical Terminology
Unit 1-B

Answers to Written Test

1. a. 7
   b. 2
   c. 4
   d. 1
   e. 3
   f. 5

2. a. K
   b. S
   c. N
   d. Y
   e. Harsh
   f. ee
   g. Eye
   h. Syllables

3. a, b, d, g

4. a. A or an
   b. Against, opposed to, reversed
   c. Bi
   d. Against, opposite
   e. Dys
   f. Interior, within, inside
   g. Glyco
   h. Same
   i. Intra
   j. Equal, same as
   k. Macro
   l. Middle, mid
   m. Mono
   n. New
   o. Para
   p. After, behind
   q. Pseudo
   r. On the upper side, above, excessive
   s. Thermo
   t. Beyond, in excess

5. a. Adeno
   b. Vessel
   c. Arterio
   d. Heart
   e. Cerebro or cerebello
   f. Colon
   g. Capit
   h. Cell
   i. Derma or dermato
   j. Back

Answers to Written Test

k. Encephalo
l. Stomach
m. Blood
n. Hepato
o. Tissue
p. Hydro
q. Larynx
r. Masto
s. Form
t. Neuro
u. Eye
v. Oro
w. Bone
x. Pneumo
y. Nose
z. Thyro
aa. Wound, injury
bb. Uro
cc. Vessel or duct
dd. Veno

6. a. Algia
b. Tumor, hernia
c. Ectomy
d. Swell
e. Emia
f. Something drawn or written
g. Graphy
h. Inflammation of
i. Ology
j. Tumor, swelling
k. Osis
l. Creation of an artificial or new opening
m. Pathy
n. Fear
o. Plasty
p. Scope
q. Treat, cure
r. Thermy
s. Cut, incise
t. Trophy

Answers to Written Test

7. a. abd. hyst.
b. $\overline{a}$
c. CA
d. B.P.
e. GI
f. Hgb.
g. mg.
h. BMR
i. NPO
j. $\overline{c}$
k. CPR
l. prep.
m. Para I (primapara)
n. O_2
o. Rh
p. $\overline{s}$
q. q.d.
r. TUR or TURP
s. WBC
t. ♀
u. $\overline{ss}$
v. strep.
w. post-op
x. os
y. O.S.
z. IV
aa. ECG, EKG
bb. M.D.
cc. CO_2
dd. BPH
ee. Gyn.
ff. K
gg. $\overline{p}$

8.	a.	12	e.	13	i.	26	m.	21
	b.	9	f.	7	j.	15	n.	25
	c.	3	g.	17	k.	2	o.	19
	d.	16	h.	4	l.	14	p.	8

Medical Terminology
Unit 1-B

Written Test

Name ____________________________________ Score ______________

1. Match the terms on the right with their correct definitions

_____a. Speech sound(s) that symbolizes and communicates a meaning without being divisible into smaller units capable of independent use

_____b. A word consisting of components that are words

_____c. The simple element inferred as the basis of a word; also called the base or stem

_____d. Sound(s) or letter(s) occurring as a bound form (unit) attached to the beginning or end of a word or root or inserted within a word or root which produces another form of the word

_____e. An affix attached to the beginning of a word or root

_____f. An affix attached to the end of a word or root

1. Affix
2. Compound word
3. Prefix
4. Root
5. Suffix
6. Terminology
7. Word

2. Complete the following statements concerning medical terminology pronunciation hints and applications.

a. **Ch** is sometimes pronounced like ______________ as in chronic, cholecystectomy

b. **Ps** is pronounced with the ______________ sound as in psychiatry, psychology

c. **Pn** in pneumonia is pronounced with only the ______________ sound

d. **C** and **G** are given the soft sound of "S" and "J," respectively, when they come before e, i, and ______________

Written Test

e. **C** and **G** have a __________________ sound before other letters as in cast, cardiac, gastric, gonad

f. The **Oe** in the middle of coelum is pronounced __________________

g. **I** at the end of alveoli is pronounced __________________

h. **E** and **es**, when forming the final letters or letter of a word, are often pronounced as separate __________________

3. Select true statements concerning rules for forming plurals by placing an "X" next to the true statements.

______a. In most English words, plurals are made by adding "s" or "es," or changing "y" to "i" and adding "es."

______b. In many Greek and Latin words, plurals are made by changing the ending of the word.

______c. When singular forms ends in **us**, the plural form is made by dropping the **s** as in alveolus — alveolu.

______d. When singular form ends in **a**, change the ending to **ae** as in fossa — fossae.

______e. When singular form ends in **um**, change the ending to **i** as in antrum — antri.

______f. When singular form ends in **is**, leave the ending **is** as in anastomosis — anastomosis.

______g. When singular form ends in **oma**, drop the **a** and add **ata** as in antheroma — antheromata.

4. Complete the following chart of prefixes and their meanings.

	PREFIXES	MEANINGS
a.	____________	Without, lack of
b.	Anti	____________
c.	____________	Twice, double
d.	Contra	____________
e.	____________	Bad, painful, difficult, disordered

Written Test

PREFIXES	MEANINGS
f. Endo	______________________
g. ______________________	Sugar, sweet
h. Homo	______________________
i. ______________________	Within, on the inside
j. Iso	______________________
k. ______________________	Large, abnormal size
l. Meso	______________________
m. ______________________	One, single, limited to one part
n. Neo	______________________
o. ______________________	Beside, beyond, near to
p. Post	______________________
q. ______________________	False
r. Supra	______________________
s. ______________________	Heat, warm
t. Ultra	______________________

5. Complete the following chart of root words and their meanings.

ROOT WORD	MEANINGS
a. ______________________	Gland
b. Angio	______________________
c. ______________________	Artery
d. Cardi or Cardio	______________________
e. ______________________	Part of brain
f. Col	______________________
g. ______________________	Head (skull)
h. Cyto	______________________
i. ______________________	Skin
j. Dorso	______________________

Written Test

ROOT WORD	MEANINGS
k. ________________	Brain
l. Gastro	________________
m. Hem, hema, hemo, hemato	________________
n. ________________	Liver
o. Histio	________________
p. ________________	Water
q. Laryngo	________________
r. ________________	Breast
s. Morpho	________________
t. ________________	Nerve
u. Ophthalmo	________________
v. ________________	Mouth
w. Osteo	________________
x. ________________	Lungs (also used in referring to air or breath)
y. Rhino	________________
z. ________________	Thyroid
aa. Trauma	________________
bb. ________________	Urine; urinary
cc. Vaso	________________
dd. ________________	Vein

6. Complete the following chart of suffixes and their meanings.

SUFFIXES	MEANINGS
a. ________________	Pain
b. Cele	________________
c. ________________	Surgical excision of
d. Edem or Edema	________________
e. ________________	Blood

Written Test

SUFFIXES	MEANINGS
f. Gram	______
g. ______	Drawing, representing, recording, describing
h. Itis	______
i. ______	Study or science of
j. Oma	______
k. ______	Condition of, state caused by
l. Ostomy	______
m. ______	Disease
n. Phobia	______
o. ______	Restoration of
p. ______	Examine, instrument for viewing
q. Therap	______
r. ______	Heat, use of heat
s. Tomy	______
t. ______	Nourish, nutrition

7. Write the medical abbreviations for the following medical/surgical terms.

a. Abdominal hysterectomy — ______

b. Before — ______

c. Carcinoma — ______

d. Blood pressure — ______

e. Gastrointestinal — ______

f. Hemoglobin — ______

g. Milligram — ______

h. Basal metabolic rate — ______

i. Nothing by mouth — ______

j. With — ______

k. Cardiopulmonary resuscitation — ______

l. Prepare for — ______

m. A woman who has only borne one child — ______

n. Oxygen — ______

o. Rhesus blood factor — ______

p. Without — ______

Written Test

q. Every day — ____________

r. Transurethral resection of the prostate gland — ____________

s. White blood count — ____________

t. Female — ____________

u. Half — ____________

v. Streptococcus — ____________

w. Post-operative — ____________

x. Mouth — ____________

y. Left eye — ____________

z. Intravenous — ____________

aa. Electrocardiogram — ____________

bb. Doctor of Medicine — ____________

cc. Carbon dioxide — ____________

dd. Benign prostatic hypertrophy — ____________

ee. Gynecology — ____________

ff. Potassium — ____________

gg. After — ____________

Written Test

8. Match medical specialists on the right with the correct descriptions.

_______a. Specializes in disorders of the brain and nerves, by surgical means

_______b. Specializes in diseases of the female reproductive system

_______c. Specializes in diseases of the heart and blood vessels

_______d. Specializes in diseases of the muscles and bones

_______e. Specializes in care of women during pregnancy, childbirth, and after childbirth

_______f. Specializes in disorders of the digestive system

_______g. Specializes in diseases of the ear, nose, and throat

_______h. Specializes in diseases of the skin

_______i. Specializes in urinary diseases of both men and women and diseases of the male reproductive system

_______j. Specializes in diseases of the eye

_______k. Specializes in administration of anesthesia during operations

_______l. Specializes in the treatment and diagnosis of tumors

_______m. Specializes in restoration of deformed or disfigured parts of the body, by surgical means

_______n. Specializes in diseases of the lungs and chest, by surgical means

_______o. Specializes in diseases of children

_______p. Specializes in the diseases associated with the aging process

1. Allergist
2. Anesthesiologist
3. Cardiologist
4. Dermatologist
5. Endocrinologist
6. Family practitioner
7. Gastroenterologist
8. Gerontologist
9. Gynecologist
10. Internist
11. Neurologist
12. Neurosurgeon
13. Obstetrician
14. Oncologist
15. Ophthalmologist
16. Orthopedist or orthopedic surgeon
17. Otolaryngologist
18. Pathologist
19. Pediatrician
20. Physiatrist
21. Plastic surgeon
22. Psychiatrist
23. Radiologist
24. Surgeon
25. Thoracic surgeon
26. Urologist

***Permission to duplicate this test is granted.**

Medical Terminology
Unit 1-B

Unit Evaluation Form

Student Name ______________________ Unit Rating ________

Assignment Sheet 1—Pronounce Medical Terminology Rating ______

Comments: ______________________

____

Assignment Sheet 2—Form Plurals for Medical Terms Rating ______

Comments: ______________________

____

Assignment Sheet 3—Interpret Medical Terminology Using Root Words and Affixes Rating ______

Comments: ______________________

____

Assignment Sheet 4—Use Medical Terminology to Identify Medical Conditions and Procedures Rating ______

Comments: ______________________

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ______________________

____

Teacher Signature ______________________ Date ________

Student Signature ______________________ Date ________

***Permission to duplicate this form is granted.**

Parts of a Word

Prefix	Root	Suffix
brady-		-ology
tachy-	cardi-	-centesis
electro-	cardio-	-graph
peri-		-itis
intra-		-sclerosis
		-scope

Medical Terminology
Unit 1-B

Information Sheet

1. **Terms and definitions**

   a. **Affix** — Sound(s) or letter(s) occurring as a bound form (unit) attached to the beginning or end of a word or root or inserted within a word or root which produces another form of the word

   b. **Compound word** — A word consisting of components that are words

   c. **Prefix** — An affix attached to the beginning of a word or root

   d. **Root** — The simple element inferred as the basis of a word; also called the base or stem

   e. **Suffix** — An affix attached to the end of a word or root

   f. **Terminology** — Words and expressions used by persons in a specific field

   g. **Word** — Speech sound(s) that symbolizes and communicates a meaning without being divisible into smaller units capable of independent use

2. **Medical terminology pronunciation hints and applications**

   Note: Listed below are some shortcuts that will be helpful in pronouncing medical terms.

   a. **Ch** is sometimes pronounced like "k" — Chronic, cholecystectomy

   b. **Ps** is pronounced with only the "s" sound — Psychiatry, psychology

   c. **Pn** is pronounced with only the "n" sound — Pneumonia

   d. **C** and **G** are given the soft sound of "s" and "j," respectively, when they come before e, i, and y — Cyclic, cytoplasm, giant, generic

   e. **C** and **G** have the harsh "k" and "g" sounds before other letters — Cast, cardiac, gastric, gonad

   f. **Ae** and **Oe** at the middle or end of words are pronounced "ee" — Coelum

   g. **I** at the end of a word (to form a plural) is pronounced "eye" — Alveoli, glomeruli

   h. **E** and **es**, when forming the final letter or letters of a word, are often pronounced as separate syllables — Nares (nar-eez)

Information Sheet

3. Rules for forming plurals

a. In most English words, plurals are made by adding "s" or "es," or changing "y" to "i" and adding "es." This rule also applies to many Greek and Latin suffixes.

Examples: Mammogram — mammograms
colectomy — colectomies

b. In many Greek and Latin words, plurals are made by changing the ending of the word.

(1) When singular form ends in **us**, the plural form is made by dropping the **us** and adding **i**.

Example: Alveolus — alveoli

(2) When singular form ends in **a**, change the ending to **ae**.

Example: Fossa — fossae

(3) When singular form ends in **um**, change the ending to **a**.

Example: Antrum — antra

(4) When singular form ends in **is**, change the ending to **es**.

Example: Anastomosis — anastomoses

(5) When singular form ends in **oma**, drop the **a** and add **ata**.

Example: Atheroma — atheromata

4. Prefixes and their meanings

PREFIXES	MEANINGS	EXAMPLES
A or An	Without, lack of	Aseptic
Ab	Away from	Abduct
Ad	To, toward, near to	Adduct
Ambi	Both	Ambidextrous
Ampho	Both	Amphogenic
Ante	Before, forward	Anterior
Anti	Against, opposed to, reversed	Antiseptic
Auto	Self	Autograft
Bi	Twice, double	Bifurcation
Brady	Slow	Bradycardia

Information Sheet

PREFIXES	MEANINGS	EXAMPLES
Brevis	Short	Brevity
Circum	Around, about	Circumference
Contra	Against, opposite	Contraindicate
Cryo	Cold	Cryothermia
Crypto	Hidden, concealed	Cryptorchism
Di, Diplo	Twice, double	Diplopia
Dis	Reversal, apart from, separation	Dislocation
Dys	Bad, painful, difficult, disordered	Dysfunction
Ec or Ecto	On outer side, exterior	Ectoderm
Endo	Interior, within, inside	Endometrium
Epi	On, upon	Epidermis
Eu	Well, good	Euphoria
Exo	Outside, on outer side, outer layer	Exogenous
Extra	Outside, beyond, in addition	Extracellular
Gravis	Heavy	Gravida
Glyco	Sugar, sweet	Glycosuria
Hemi	Half	Hemiplegia
Hetero	Other, relationship to other	Heterograft
Homo	Same	Homogeneous
Hydro	Wet, water	Hydronephrosis
Hyper	Over, above, excessive	Hyperactive
Hypo	Under, below, deficient	Hypotension
In	In, into	Infiltration
Infra	Underneath, below	Infraorbital
Inter	Between, among	Intercostal
Intra	Within, on the inside	Intracranial
Intro	Into, within	Introduce
Iso	Equal, same as	Isotonic
Macro	Large, abnormal size	Macroscopic
Magna	Large, great	Magnitude
Medius	Middle	Median
Meta	Beyond, after, change	Metastasis
Meso	Middle, mid	Mesoderm
Minimus	Smallest	Minimus
Micro	Small	Microscopic
Mio	Less	Mioplasmia
Mono	One, single, limited to one part	Monocular
Multi	Many, much	Multipara
Necro	Dead	Necrotic
Neo	New	Neoformation
Oligo	Few, scanty, little	Oliguria
Ortho	Straight, normal, correct	Orthodontic
Pachy	Thick	Pachyderm
Paleo	Old	Paleogenetic

Information Sheet

PREFIXES	MEANINGS	EXAMPLES
Pan	All	Panacea
Para	Beside, beyond, near to	Paramedian
Per	Through, excessive	Perforate
Peri	Around, about	Periosteum
Poly	Many, much	Polycythemia
Post	After, behind	Postoperative
Pre	Before, in front of	Preoperative
Pro	Before, in front of	Prognosis
Pronus	Face down	Pronate
Pseudo	False	Pseudomonia
Py	Pus	Pyorrhea
Re	Back, again, contrary	Regurgitation
Retro	Backward. located behind	Retrocecal
Sclero	Hard	Sclerotic
Scolia	Twisted, crooked	Scoliosis
Semi	Half	Semiconscious
Steno	Narrow	Stenosis
Stereo	Solid, three dimensions	Stereoscope
Sub	Under	Sublingual
Super	Above, upper, excessive	Superclavicular
Supinus	Face up	Supine
Supra	On the upper side, above, excessive	Suprarenal
Sym, Syn	Together, with	Symphysis
Tachy	Fast, swift	Tachycardia
Tele	End, far away	Telescope
Thermo	Heat, warm	Thermal
Trans	Across, through, beyond	Transverse
Ultra	Beyond, in excess	Ultrasonic
Xero	Dry	Xerodermia

5. **Root words and their meanings**

ROOT WORD	MEANINGS	EXAMPLES
Adeno	Gland	Adenoma
Adreno	Adrenal gland	Adrenalism
Angio	Vessel	Angiogram
Ano	Anus	Anoplasty
Arterio	Artery	Arteriogram
Arthro	Joint	Arthrodesis
Balano	Glans penis	Balanitis
Blepharo	Eyelid	Blepharoplasty
Broncho	Bronchus	Bronchitis

Information Sheet

ROOT WORD	MEANINGS	EXAMPLES
Cantho	Canthus	Canthitis
Capit	Head	Capitate
Cardi or Cardio	Heart	Cardiology
Carpo	Wrist	Carpectomy
Cephalo	Head	Cephalitis
Cerebello	Part of brain	Cerebellum
Cerebro	Part of brain	Cerebrum
Cheilo	Lip	Cheiloplasty
Chole	Bile or gall	Cholecystitis
Choledocho	Common bile duct	Choledochitis
Cholecyst	Gallbladder	Cholecystitis
Chondro	Cartilage	Chondritis
Chordo	Cord	Chordotomy
Cilia	Hair (Latin)	Ciliary
Cleido	Collarbone	Cleidotomy
Coccygo	Coccyx	Coccygectomy
Col	Colon	Colectomy
Colpo	Vagina	Colpotomy
Cordo	Cord (usually vocal cord)	Cordopexy
Cost	Rib	Costal
Coxa	Hip (Latin)	Coxalgia
Cranio	Head (skull)	Craniotomy
Cut	Skin	Cuticular
Cysto	Sac, cyst, urinary bladder	Cystotomy
Cyto	Cell	Cyton
Dacryo	Tear (or tear duct or sac)	Dacryocystitis
Dento or Donto	Tooth	Dentures
Derma or Dermato	Skin	Dermatome
Duodeno	Duodenum	Duodenitis
Dorso	Back	Dorsal
Encephalo	Brain	Encephalitis
Entero	Intestines	Enterostomy
Fascia	Sheet or band of fibrous tissue (Latin)	Fasciectomy
Fibro	Fibers	Fibroadenoma
Gastro	Stomach	Gastrectomy
Genu	Knee (Latin)	Genuflect
Gingivo	Gums	Gingivectomy
Glomerulo	Glomerulus	Glomerulitis
Glosso	Tongue	Glossectomy
Gnatho	Jaw	Gnathodynia
Gon	Knee (Greek)	Gonarthritis
Gynec	Women	Gynecology

Information Sheet

ROOT WORD	MEANINGS	EXAMPLES
Hallux	Great toe (Latin)	Hallux flexus
Hem, hema, hemo, hemato	Blood	Hematology
Hepato	Liver	Hepatitis
Hilus	Pit or depression in organ where vessels and nerves enter (Latin)	Hilum
Histio	Tissue	Histioma
Hydro	Water	Hydrocele
Hystero	Uterus	Hysterectomy
Ileo	Ileum (part of small intestine)	Ileostomy
Ilio	Flank or ilium (bone of the pelvis)	Iliosacral
Jejuno	Jejunum	Jejunostomy
Kerato	Cornea or horny layer of the skin	Keratosis
Labio	Lips (either mouth or vulva)	Labiology
Lacrimo	Tears (used also in connection with tear ducts or sacs)	Lacrimation
Lamin	Posterior vertebral arch	Laminectomy
Laparo	Loin or flank (also refers to abdomen)	Laparotomy
Laryngo	Larynx	Laryngoscopy
Linguo	Tongue	Sublingual
Lympho	Lymph	Lymphoma
Masto	Breast	Mastectomy
Meningo	Coverings of brain and spinal cord (meninges)	Meningitis
Metra, metro	Uterus	Metrorrhagic
Morpho	Form	Morphology
Myelo	Bone marrow or spinal cord	Myelitis
Myo	Muscle (Greek)	Myomectomy
Myringo	Ear drum	Myringotomy
Naso	Nose	Nasopharynx
Nephro	Kidney	Nephropexy
Neuro	Nerve	Neuritis
Onycho	Nails	Onychitis
Oophoro	Ovary	Oophorectomy
Ophthalmo	Eye	Ophthalmoscope
Orchio, orchido	Testicle	Orchiectomy
Oro	Mouth	Oropharynx
Os	Bone or mouth	Osteotome
Osteo	Bone	Osteomyelitis
Oto	Ear	Otoscope
Ovario	Ovary	Ovarian
Palato	Palate of mouth	Palatitis

Information Sheet

ROOT WORD	MEANINGS	EXAMPLES
Palpebro	Eyelid	Palpebrate
Pectus	Breast, chest, or thorax (Latin)	Pectus Excavatum
Pharyngo	Pharynx	Pharyngoscopy
Phleb	Vein	Phlebitis
Pilo	Hair	Pilocystic
Pleuro	Pleura of lung (relates also to side or rib)	Pleurisy
Pneumo or pneumono	Lungs (also air or breath)	Pneumonectomy
Procto	Rectum	Proctoscopy
Prostate	Prostate gland	Prostatectomy
Pyelo	Pelvis of kidney	Pyelitis
Pyloro	Pylorus	Pyloroplasty
Pur	Pus	Purulent
Rhino	Nose	Rhinoplasty
Sacro	Sacrum	Sacrolumbar
Salpingo	Fallopian tube or oviduct	Salpingectomy
Sialo	Saliva (used in connection with a salivary duct or gland)	Sialism
Spermato	Semen	Spermatic
Splanchno	Viscera (organs)	Splanchnology
Tarso	Instep of feet; ankle (also edge of eyelids)	Tarsolgia
Teno, Tenonto	Tendon	Tendonitis
Thoraco	Thorax or chest	Thoracotomy
Thyro	Thyroid	Thyroidectomy
Trachelo	Neck, particularly the neck of the uterus	Trachelorrhaphy
Tracheo	Trachea	Tracheotomy
Trauma	Wound, injury	Traumatic
Unguis	Toe or fingernail	Unguisectomy
Uretero	Ureter (tube from kidney)	Ureterolithotomy
Urethro	Urethra (tube from bladder)	Urethroscopy
Uro	Urine; urinary	Urology
Utero	Uterus	Uteritis
Vaso	Vessel or duct	Vasectomy
Veno	Vein	Venogram
Ventriculo	Ventricle, either of heart or brain	Ventriculogram
Viscero	Viscera (organs)	Visceroskeletal

Information Sheet

6. Suffixes and their meanings

SUFFIXES	MEANINGS	EXAMPLES
Algia	Pain	Neuralgia
Cele	Tumor, hernia	Cystocele
Centesis	Puncture to aspirate	Thoracentesis
Desis	Fusion	Arthrodesis
Ectomy	Surgical excision of	Appendectomy
Edem or edema	Swell	Lymphedema
Emia	Blood	Leukemia
Genesis	Produce, origin	Homogenesis
Gram	Something drawn or written	Cystogram
Graphy	Drawing, representing, recording, describing	Encephalography
Itis	Inflammation of	Peritonitis
Lithiasis	Pertaining to stones	Cholelithiasis
Lithotomy	Incision for stone removal	Nephrolithotomy
Lysis	Breaking up, freeing, dissolving	Hemolysis
Ology	Study or science of	Pathology
Oma	Tumor, swelling	Hematoma
Orrhaphy	Repair of	Herniorrhaphy
Oscopy	Examination of an organ by viewing	Cystoscopy
Osis	Condition of, state caused by	Hydronephrosis
Ostomy	Creation of an artificial or new opening	Colostomy
Otomy	Incision into an organ or tissue	Thoracotomy
Pathy	Disease	Myopathy
Pexy	Fixation or suturing in place	Nephropexy
Phobia	Fear	Claustrophobia
Plasty	Restoration of	Cranioplasty
Plegia	Paralyze	Paraplegia
Ptosis	Fall, drooping	Proctoptosis
Rrhagia	Burst forth, pour	Menorrhagia
Rrhaphy	Suture	Herniorrhaphy
Rrhea	Flow, discharge	Leukorrhea
Rrhexis	Rupture	Enterorrhexis
Scope	Examine, instrument for viewing	Microscope
Stasis	Stop, stand still	Hemostasis
Therap	Treat, cure	Chemotherapy
Thermy	Heat, use of heat	Diathermy
Tome	A cutting instrument	Adenotome
Tomy	Cut, incise	Arthrotomy
Trophy	Nourish, nutrition	Atrophy

Information Sheet

7. Abbreviations and their interpretations

ABBREVIATIONS	INTERPRETATIONS
a. ⓐ	at, around
ā	before
$\overline{aa}$	of each
A.A.A.	abdominal aortic aneurism
abd.	abdomen
abd. hyst.	abdominal hysterectomy
abort. or AB	abortion
a.c.	before eating (ante cibrum)
accom.	accommodation
ACTH	adrenocorticotrophic hormone
ad lib.	at pleasure: as desired or needed
adm.	admission
alb.	albumin
A.M.	morning
amp.	ampule
amt.	amount
Anat.	anatomy or anatomical
ANS	autonomic nervous system
ant. ax. line	anterior axillary line
aort. regurg.	aortic regurgitation
aort. sten.	aortic stenosis
A-P	anteroposterior
A-P and Lat.	anteroposterior and lateral
ASHD	arteriosclerotic heart disease
atr. fib.	atrial fibrillation
A-V	arteriovenous
b. Ba. enema or B.E.	barium enema
baso.	basophil
b.i.d.	twice a day
bilat.	bilateral
bili.	bilirubin
BKA	below knee amputation
bl. cult.	blood culture
br. sounds or B.S.	breath sounds
B.M.	bowel movement
BMR	basal metabolic rate
B.P.	blood pressure
BPH	benign prostatic hypertrophy
BUN	blood area nitrogen

Information Sheet

ABBREVIATIONS	INTERPRETATIONS
c. $\bar{c}$	with
C.	Celsius, centigrade
C	carbon
C. & S.	culture and sensitivity
CA	carcinoma
Ca	calcium
cath.	catheter, catheterization
CBC	complete blood count
cc.	cubic centimeters
CC	chief complaint
CHF	congestive heart failure
Chol	cholesterol
Cl	chloride
cldy.	cloudy
cm.	centimeter
CNS	central nervous system
cont.	continued
CO_2	carbon dioxide
CPR	cardiopulmonary resuscitation
CSF	cerebrospinal fluid
CVA	cerebrovascular accident
CVP	central venous pressure
d. d.c., disc.	discontinue
D&C	dilation and curettage
decr.	decreased or diminished
Derm.	Dermatology
diff.	Differential blood count
disch.	discharge
D.O.	Doctor of Osteopathy
DOA	dead on arrival
D/W	dextrose in water
e. ECG, EKG	electrocardiogram
EDC	estimated date of confinement
EEG	electroencephalogram
EENT	eye, ear, nose, and throat
elix.	elixir
EMS	Emergency Medical Service
ENT	ear, nose, and throat
EOM	extraocular movement
eosin, or eos	eosinophil (a type of white blood cell)
epith.	epithelial or epithelium
ER	Emergency Room

Information Sheet

ABBREVIATIONS	INTERPRETATIONS
E.S.T.	electroshock therapy
et.	and
et. al.	and other
expir., exp.	expiration or expiratory
f. F., Fahr.	Fahrenheit
Fe	iron
FH	family history
F.H.S.	fetal heart sounds
F.H.T.	fetal heart tones
fl.	fluid
fl. oz.	fluid ounce
for. body or F.B.	foreign body
fract.	fracture
freq.	frequent
FSH	follicle-stimulating hormone
ft.	foot
g. GB	gallbladder
GC	gonococcal or gonorrheal
GI	gastrointestinal
Gm., gm.	gram
Grav. I, II, etc.	primigravida, secundigravida, etc. (Indicating a woman of so many pregnancies)
gtt. or gtts.	drop or drops
GU	genitourinary
Gyn.	gynecology
h. h or hr.	hour
HCL	hydrochloric acid
Hct.	hematocrit
Hgb.	hemoglobin
hpf	high powered field
H_2O	water
h.s.	at bedtime (hour of sleep)
hypo.	hypodermic
i. I	iodine
I^{131}	radioactive iodine
ICU	Intensive Care Unit
I.&D.	incision and drainage
IM	intramuscular
incr.	increased or increasing
inspir.	inspiration or inspiratory

Information Sheet

ABBREVIATIONS	INTERPRETATIONS
I&O	intake and output
IOL	intraocular lens
IOP	intraocular pressure
IPPB	Intermittent Positive Pressure Breathing
IQ	intelligence quotient
IV	intravenous
IVP	intravenous pyelogram
k. K	potassium
Kg.	kilogram
KUB	kidney, ureter, and bladder (x-ray)
l. L	left
lab.	laboratory
lat.	lateral
lb.	pound
LH	luteinizing hormone
liq.	liquid
Lobes of lung:	
LLL	left lower lobe
LUL	left upper lobe
RUL	right upper lobe
RLL	right lower lobe
RML	right middle lobe
Quadrants of the abdomen	
LLQ	left lower quadrant
LUQ	left upper quadrant
RLQ	right lower quadrant
RUQ	right upper quadrant
L.M.P.	last menstrual period
L.P.	lumbar puncture
l&w	living and well
lymphs	lymphocytes
m. M.D.	Doctor of Medicine
mEq (mEq/L)	milliequivalents (per liter)
mg.	milligram
Mg.	magnesium
MI	myocardial infarction
min.	minute
ml.	milliliter
mm.	millimeter
mono.	monocyte
MS	multiple sclerosis

Information Sheet

ABBREVIATIONS	INTERPRETATIONS
n. Na	Sodium
neg.	negative
Neuro.	neurology or neurological
NM	neuromuscular
NS	neurosurgery, nervous system
noct.	nocturnal
NPO	nothing by mouth
o. O_2	oxygen
O_2 cap.	oxygen capacity
O_2 sat.	oxygen saturation
OB or obs.	obstetrics or obstetrical
Occ. Th., O.T.	occupational therapy
O.D	right eye (oculus dexter)
Op	operation
ophth	ophthalmic
OR	operating room
orth., ortho.	orthopedic
O.S.	left eye (oculus sinister)
os	mouth
O.U.	both eyes
oz.	ounce
p. $\bar{p}$	after
P	phosphorus
PA	posteroanterior
P&A	percussion and auscultation
Para I, II, etc.	primipara, secundipara, etc. (a woman having borne so many children)
paracent.	paracentesis
PBI	protein bound iodine
p.c.	after meals
P.E.	physical examination
Ped.	pediatric
per	by way of
P.H.	past history
pH	hydrogen ion concentration
Pharm.	pharmacy
Phys. Ther. or P.T.	physical therapy
P.I.	present illness
P.I.D.	Pelvic Inflammatory Disease
PNS	peripheral nervous system
p.o.	by mouth
pO_2	partial pressure of oxygen
pCO_2	partial pressure of carbon dioxide

Information Sheet

ABBREVIATIONS	INTERPRETATIONS
polio	poliomyelitis
poplit.	popliteal
polys	polymorphonuclear leukocytes
post-op	post-operative
prep.	prepare for, preparation
p.r.	per rectum
p.r.n.	as often as necessary
prot.	protein
prothr. cont.	prothrombin content
psi	pounds per square inch
psych	psychiatric
PT (prothr. time)	prothrombin time
PTT	partial thromboplastin time
q. q.d.	every day
q.h.	every hour
q.i.d.	four times daily
q.n.	every night
q2h, q3h, etc.	every two hours, every three hours, etc.
q.n.	quantity not sufficient
q.o.d.	every other day
quant.	quantity or quantitative
q.s.	quantity sufficient
r. R.	right
rbc	red blood cell
RBC	red blood count
resp.	respirations
Rh	Rhesus blood factor
rre or RRE	round, regular, and equal
Rx	therapy
s. $\overline{s}$	without
$\overline{ss}$	half
sat.	saturation
sed. rate (E.S.R.)	erythrocyte sedimentation rate
SMR	submucous resection
S.O.B.	short of breath
sol.	solution
s.o.s.	may be repeated once if urgently required
sp. gr.	specific gravity
spec.	specimen
SS enema	soapsuds enema

Information Sheet

ABBREVIATIONS		INTERPRETATIONS
	Sq. cell	squamous cell
	staph.	staphylococcus
	stat.	immediately and once only
	stillb.	stillborn or still birth
	strep.	streptococcus
	subling	sublingual, under the tongue
	subq. or subcu.	subcutaneous
	surg.	surgery or surgical
	sympt.	symptoms
	sympat.	sympathetic
t.	T&A	tonsillectomy and adenoidectomy
	T&C	type and crossmatch
	TB	tuberculosis
	tbsp. or T	tablespoon
	Temp.	temperature
	t.i.d.	three times daily
	TPR	temperature, pulse, and respiration
	tsp. or t	teaspoon
	TUR (TURP)	transurethral resection of the prostate gland
	TURB	transurethral resection of the bladder
u.	U.	Unit
	UA	urine analysis
	UGI	upper gastrointestinal
	URI	upper respiratory infection
	Urol.	Urology or urological
v.	vag.	vagina or vaginal
	vag. hyst.	vaginal hysterectomy
	VC, vit. cap.	vital capacity
	VD	venereal disease
	VDRL	Venereal Disease Research Laboratory (used to signify blood test for syphilis)
	via	by ways of
	vit.	vitamin (usually followed by a specific letter)
	v.o.	verbal order
	vol.	volume
	V.S.	vital signs

Information Sheet

ABBREVIATIONS	INTERPRETATIONS
w. Wass.	Wassermann test
wbc.	white blood cell
WBC	white blood count
wn, wd	well nourished, well developed
wt.	weight
♀	female
♂	male

Note: If in doubt, write it out!

8. Medical specialists and descriptions

Note: To be recognized as specialists by the American Medical Association (AMA), medical doctors (M.D.s) must study and be trained in the special area in which they wish to practice. Before they can begin their practice as recognized specialists, they must pass a qualifying examination.

a. Allergist — Specializes in body reactions that result from sensitivity to foods, animals, pollens, and other agents

b. Anesthesiologist — Specializes in administration of anesthesia during operations

c. Cardiologist — Specializes in diseases of the heart and blood vessels

d. Dermatologist — Specializes in diseases of the skin

e. Endocrinologist — Specializes in diseases resulting from disorders of the endocrine glands

f. Family practitioner — Treats health problems of family members

Note: A family practitioner often refers patients with special problems to other specialists listed here.

g. Gastroenterologist — Specializes in disorders of the digestive system

h. Gerontologist — Specializes in the diseases associated with the aging process

i. Gynecologist — Specializes in diseases of the female reproductive system

j. Internist — Specializes in internal medicine by nonsurgical means

k. Neurologist — Specializes in disorders of the brain and nerves, by nonsurgical means

Information Sheet

l. Neurosurgeon — Specializes in disorders of the brain and nerves, by surgical means

m. Obstetrician — Specializes in care of women during pregnancy, childbirth, and after childbirth

n. Oncologist — Specializes in the treatment and diagnosis of tumors

o. Ophthalmologist — Specializes in diseases of the eye

p. Orthopedist or orthopedic surgeon — Specializes in diseases of the muscles and bones

q. Otolaryngologist — Specializes in diseases of the ear, nose, and throat

r. Pathologist — Specializes in the study of changes in body tissue and body chemistry

Note: Usually the pathologist works in a laboratory.

s. Pediatrician — Specializes in diseases of children

t. Physiatrist — Specializes in diseases and injuries of the handicapped and convalescent by natural methods, especially physical therapy

u. Plastic surgeon — Specializes in restoration of deformed or disfigured parts of the body, by surgical means

v. Psychiatrist — Specializes in disorders of the mind

w. Radiologist — Specializes in the diagnosis and treatment of disease by use of radiant energy

x. Surgeon — Specializes in performing operative (surgical) procedures

y. Thoracic surgeon — Specializes in diseases of the lungs and chest, by surgical means

z. Urologist — Specializes in urinary diseases of both men and women and diseases of the male reproductive system

Medical Terminology
Unit 1-B

Student Supplement 1—Review Prefixes and Their Meanings

Name ______________________________ Date ________________

Directions: Complete the following chart by writing either the prefix or the meaning in the blanks provided.

PREFIXES	MEANINGS
1. ________	Backward, located behind
2. Super	________
3. ________	Into, within
4. Ab	________
5. Infra	________
6. Ecto	________
7. ________	Heavy
8. ________	Hidden, concealed
9. ________	Before, forward
10. Para	________
11. Pre, pro	________
12. ________	False
13. Semi, hemi	________
14. Dys	________
15. Bi	________
16. Meso	________
17. ________	Hard
18. ________	Dry
19. ________	Pus
20. ________	One, single, limited to one part
21. ________	New
22. Sub	________
23. Glyco	________
24. A, an	________
25. Epi	________
26. Thermo	________
27. ________	Dead
28. ________	To, toward, near to
29. Endo	________
30. Cryo	________
31. Di, diplo	________
32. Anti	________
33. ________	Many, much
34. ________	Narrow
35. Contra	________

Medical Terminology
Unit 1-B

Student Supplement 2—Review Root Words and Their Meanings

Name ______________________________ Date ______________

Directions: Complete the following chart by writing the root word (stem) or the meaning in the blanks provided.

ROOT WORDS	MEANINGS
1. Cysto	
2.	Gallbladder
3. Rhino	
4.	Rectum
5.	Lips
6.	Vessel or duct
7.	Kidney
8. Chole	
9. Hydro	
10. Pneumo	
11. Osteo	
12.	Ear drum
13.	Tooth
14.	Cord
15.	Nerve
16.	Tongue
17. Ano	
18. Oto	
19. Thoraco	
20.	Heart
21. Lacrimo	
22. Phleb	
23.	Colon
24.	Brain
25. Uretero	
26. Urethro	
27. Pleuro	
28. Dorso	
29.	Eye
30.	Stomach
31. Masto	
32. Gynec	
33. Cost	
34. Hepato	

Medical Terminology
Unit 1-B

Student Supplement 3—Review Suffixes and Their Meanings

Name ______________________________ Date ________________

Directions: Complete the following chart by writing either the suffix or the meaning in the blanks provided.

SUFFIXES	MEANINGS
1. Oscopy	
2. Rrhea	
3. Pexy	
4. Graphy	
5.	Stop, stand still
6.	Inflammation of
7.	Pain
8. Genesis	
9. Tomy	
10. Centesis	
11.	Pertaining to stones
12. Ectomy	
13. Pathy	
14. Rrhagia	
15.	Fall, drooping
16. Osis	
17. Gram	
18.	Incision into an organ or tissue
19. Trophy	
20.	Study or science of
21.	Tumor, swelling
22. Lysis	
23. Therap	
24.	Fear
25. Tome	
26. Orrhaphy	
27. Plasty	
28.	Heat, use of heat
29.	Paralyze
30. Cele	

Medical Terminology
Unit 1-B

Student Supplement 4—Review Abbreviations and Their Interpretations

Name ______________________________ Date ______________

Directions: Complete the following chart by writing the correct medical abbreviation or the interpretation in the blanks provided.

ABBREVIATIONS	INTERPRETATIONS
1. ______	Carbon dioxide
2. ECG, EKG	______
3. ______	Cardiopulmonary resuscitation
4. $\bar{c}$	______
5. ______	Before
6. CA	______
7. ______	Abdominal hysterectomy
8. BPH	______
9. ______	Basal metabolic rate
10. B.P.	______
11. ______	Transurethral resection of the prostate gland
12. os	______
13. ______	Doctor of Medicine
14. GI	______
15. ______	Intravenous
16. prep.	______
17. ______	Potassium
18. O.S.	______
19. ______	Peripheral nervous system
20. $\bar{p}$	______
21. ______	Nothing by mouth
22. WBC	______
23. ______	Female
24. Strep.	______
25. ______	Every day

Student Supplement 4

ABBREVIATIONS	INTERPRETATIONS
26. mg.	
27.	Primipara
28. post-op	
29.	Without
30. Rh	
31.	Oxygen
32. Gyn.	
33.	Half
34. wbc.	
35.	Type and crossmatch
36. wt.	
37.	As often as necessary
38. $\overline{aa}$	
39.	Above the knee amputation
40. b.i.d.	
41.	Complete blood count
42. lat.	
43.	Hemoglobin
44. IM	
45.	Dilation and curettage
46. LLL	
47.	Pelvic inflammatory disease
48. O.D.	
49.	Vital signs
50. RLQ	

Medical Terminology
Unit 1-B

Assignment Sheet 1—Pronounce Medical Terminology

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Words are pronounced correctly.	______
Voice tone is natural.	______

Directions: Pronounce the following words orally for your instructor. You may wish to refer to Objective 2 in the Information Sheet or consult a standard or medical dictionary.

1. Ileum
2. Hemostasis
3. Anastomoses
4. Amenorrhea
5. Metastasis
6. Ileostomy
7. Ureterosigmoidostomy
8. Aseptic
9. Pneumoencephalography
10. Analgesia
11. Triage
12. Choledochojejunostomy
13. Fasciculi
14. Aerobic
15. Pharmaceutical
16. Epithelial
17. Cystoscopy
18. Epinephrine
19. Laparotomy
20. Cecum
21. Psychosis
22. Nephrectomy
23. Fascia
24. Anoxemia
25. Ischemia

Medical Terminology
Unit 1-B

Assignment Sheet 2--Form Plurals for Medical Terms

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Terms have correct plural endings.	______
Terms are spelled correctly.	______

Directions: Change the following singular medical terms into their plural forms. You may wish to refer to Objective 3 in the Information Sheet or consult a standard or medical dictionary.

1. Metastasis — ______________________________
2. Carcinoma — ______________________________
3. Vagus — ______________________________
4. Colostomy — ______________________________
5. Carina — ______________________________
6. Bronchus — ______________________________
7. Septum — ______________________________
8. Leiomyoma — ______________________________
9. Ostium — ______________________________
10. Denture — ______________________________
11. Cornea — ______________________________
12. Thrombosis — ______________________________
13. Punctum — ______________________________
14. Hernia — ______________________________
15. Glomerulus — ______________________________

Assignment Sheet 2

16. Bacterium — ____________________
17. Coccus — ____________________
18. Trauma — ____________________
19. Fundus - ____________________
20. Salpinx — ____________________
21. Bacillus — ____________________
22. Brachium — ____________________
23. Sinus — ____________________
24. Cervix — ____________________
25. Cilium — ____________________
26. Concha — ____________________
27. Condylus — ____________________
28. Vessel — ____________________
29. Spermatozoon — ____________________
30. Naris — ____________________
31. Ligament — ____________________
32. Cholecystectomy — ____________________
33. Laparoscopy — ____________________
34. Hemorrhoidectomy — ____________________
35. Fossa — ____________________
36. Forcep — ____________________
37. Disease — ____________________
38. Surgery — ____________________
39. Hemostat — ____________________
40. Artery — ____________________

Medical Terminology
Unit 1-B

Assignment Sheet 3—Interpret Medical Terminology Using Root Words and Affixes

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Terms are correctly divided into roots and affixes.	______
Meanings of terms are correctly interpreted.	______

Directions: Divide the following words into their root(s) and affixes, and then state their meanings in the blanks provided.

Example: Laryng/itis — Inflammation of the larynx

1. Rhinoplasty — ______________________________
2. Myocardia — ______________________________
3. Oophorocystectomy — ______________________________
4. Hemicolectomy — ______________________________
5. Colposcopy — ______________________________
6. Neonatal — ______________________________
7. Thermogram — ______________________________
8. Arteriosclerosis — ______________________________
9. Choledochostomy — ______________________________
10. Dysmenorrhea — ______________________________
11. Hydrophobia — ______________________________
12. Paramedian — ______________________________
13. Osteoarthritis — ______________________________
14. Proctology — ______________________________

Assignment Sheet 3

15. Dacryocystectomy —______________________________

16. Anticoagulant — ______________________________

17. Bilateral — ______________________________

18. Microorganism — ______________________________

19. Otorhinolaryngology — ______________________________

20. Pyloric stenosis — ______________________________

Medical Terminology
Unit 1-B

Assignment Sheet 4—Use Medical Terminology to Identify Medical Conditions and Procedures

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Conditions/Procedures are correctly stated in medical terms.	______
Terms are spelled correctly.	______

Directions: Write the proper medical term for the medical conditions and procedures given below.

1. Inflammation of the gallbladder ______________________________.
2. Inflammation of the neck of the uterus ______________________________.
3. Inflammation of the inner lining of the heart ______________________________.
4. A swelling or mass of blood ______________________________.
5. An excess (more than normal) amount of blood in a body part ____________________.
6. Surgical removal of the uterus ______________________________.
7. Abnormal fat in the blood ______________________________.
8. The condition of gallstones ______________________________.
9. A tumor made up of muscular tissue ______________________________.
10. A doctor of medicine who specializes in the eyes ______________________________.
11. The adjective that means of the nature or quality of bone or bone tissue ____________.
12. A surgical creation of an artificial opening or passage between the stomach and the intestines is ______________________________.
13. Beside the liver ______________________________.
14. Plastic surgery (surgical repair) of the anus is ______________________________.

Assignment Sheet 4

15. Study of the causes of mental disease ____________________.

16. An instrument to look at or observe the stomach ____________________.

17. Enlargement of the heart ____________________.

18. An involuntary contraction of the eyelid ____________________.

19. Surgical opening into the stomach ____________________.

20. The destruction of red blood cells ____________________.

Basic Safety
Unit 1-C

Objective Sheet

Unit Objective

After completing this unit, the student should be able to discuss a good safety attitude and guidelines for fire, electrical, and equipment safety. The student should also be able to subscribe to a safety pledge and apply safety principles to the school or workplace. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to basic safety with their correct definitions.
2. Discuss ways of developing a good safety attitude.
3. Complete statements concerning personal safety guidelines.
4. List expectations for a safe environment at school or work.
5. Complete statements concerning the principles of body mechanics.
6. List basic types of emergencies.
7. Discuss severe weather guidelines.
8. Arrange in order the steps to follow in case of a bomb threat.
9. Describe how to conduct a fire evacuation.
10. List components of a fire.
11. Match the classifications of fires with their correct fuel sources.
12. Arrange in order the steps in using a fire extinguisher.
13. Discuss ways to prevent fires.
14. Complete statements concerning electrical safety.
15. Select true statements concerning basic equipment safety.
16. Subscribe to a safety pledge. (Assignment Sheet 1)
17. Apply safety principles to the school and workplace. (Assignment Sheet 2)

Basic Safety
Unit 1-C

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—The Fire Triangle (Objective 10)
   TM 2—Classes of Fires (Objective 11)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Suggested Activities

Evaluation

12. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

13. Make copies of the written test. Add or modify test items as needed.

14. Give written test.

15. Record assignment sheet ratings and written test scores on the Unit Evaluation Form. Add any additional assignments or supplemental activities that should be part of the unit evaluation.

16. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Develop a crossword puzzle to assist students in learning the terms in this unit.

2. Discuss what it means to be a "safe" person. **Communication skills**

3. Demonstrate good and poor body mechanics. Have students practice good posture and the correct techniques for lifting.

4. Invite a guest speaker to talk about back injuries occurring in the workplace. **Communication skills**

5. Go on a campus tour to inspect good and poor examples of safety.

6. Have a scavenger hunt for specific types of fire extinguishers around the campus. **Group effectiveness skills**

7. Discuss severe weather procedures to follow when at school and at the clinical site. **Communication skills**

8. Relate situations that may be appropriate to your area concerning weather or natural disasters.

9. Role play a "bomb threat" situation. How much information can be obtained to report to the authorities? **Communication skills, group effectiveness skills**

Suggested Activities

10. Explain classroom fire drill procedures. Then have students participate in a fire drill. **Group effectiveness skills**

11. Arrange for the local fire department to demonstrate the use of fire extinguishers. Let students practice using a fire extinguisher.

12. Show videos relating to safety procedures. **Communication skills**

13. Tour the burn unit of a hospital in your area. Discuss how specific burns occurred and have students decide what could have been done to prevent them. **Communication skills, problem-solving skills**

Resources Used in Developing This Unit

1. Atkinson, Lucy Jo. *Berry and Kohn's Operating Room Techniques*. 7th ed. St. Louis: C. V. Mosby Year Book, 1992.

2. Meeker, Margaret Huth and Jane C. Rothrock. *Alexander's Care of the Patient in Surgery*. 9th ed. St. Louis: Mosby Year Book, Inc., 1991.

3. *Safety and Health*. San Francisco: Parlay International, 1988.

Suggested Supplement Resources

1. *Slips, Trips, and Falls*, 14-minute videotape that identifies major slip, trip, and fall hazards which may endanger employees.

2. *Protecting Your Back*, 19-minute videotape and handbooks that give instruction in proper body mechanics, patient transfer techniques, and exercises.

3. *Fire Safety Series*, 2 parts that give critical training to help survive fires. Includes videotapes and handbooks that present common hospital fire situations and proper fire extinguisher applications and methods.

    a. *Fire Emergency* (1991 Telly Award), 16 minutes

    b. *Fire Extinguishers*, 14 minutes

1-3 are available from:

Coastal Health Care
3083 Brickhouse Court
Virginia Beach, VA 23452
800-729-4325 or 804-498-3560

Suggested Activities

4. *Body Mechanics*, 14-minute, non-motion videotape that discusses the principles of body alignment, balance, and posture. Demonstrates correct techniques of body mechanics.

5. *Transfer Activities and Ambulation*, 14-minute, non-motion videotape that discusses the principles of patient transfer and ambulation, emphasizing proper body mechanics and safety.

   4 and 5 are available from:

   Medcom/Trainex
   P.O. Box 3225
   Garden Grove, CA 92641
   800-877-1443 or 714-891-1443

6. *Back Talk*, 30-minute videotape that demonstrates proper body mechanics to help nurses avoid back problems. Also demonstrates exercises to strengthen back muscles. Available from:

   American Journal of Nursing Company
   Educational Services Division
   555 West 57th Street
   New York, NY 10019-2961
   800-CALLAJN (225-5256)

7. *Employee Safety Revisited*, 20-minute videotape that covers falls, back injuries, and universal precautions.

8. *Lifting Techniques and Body Mechanics*, 20-minute videotape that demonstrates lifting, pushing, and carrying an object. Designed for support personnel.

   7 and 8 are available from:

   Fairview Audio-Visuals
   17909 Groveland Avenue
   Cleveland, OH 44111
   216-476-7054

9. *Introduction to Injury Prevention*, 13-minute general introduction to body mechanics and posture. Designed for a general audience.

10. *Back Saving Skills for Hospital Personnel*, 16-minute videotape that covers body mechanics and posture applied to a health care work environment. Includes lifting, pushing/pulling, and posture maintenance.

Suggested Activities

11. *Back Saving Skills for Patient Care*, 18-minute videotape that covers the principles of body mechanics and posture applied to typical patient related activities. Includes transfers and equipment to assist.

    9-11 are available from:

    Sacred Heart Medical Center
    c/o Care Video Productions
    1650 Crossings Parkway
    Westlake, OH 44145

12. *Working to Save Your Back*, 10-minute videotape that introduces nurses and hospital staff to techniques for safe and efficient moving of patients. Designed to ensure the protection of the healthcare provider's back. Available from:

    Heath Sciences Consortium
    201 Silver Cedar Court
    Chapel Hill, NC 27514-1517
    919-942-8731

Basic Safety
Unit 1-C

Answers to Written Test

1. a. 7
   b. 13
   c. 1
   d. 10
   e. 14
   f. 5
   g. 12
   h. 11
   i. 4
   j. 6
   k. 2

2. Discussion should include at least three of the following points (in the student's own words):

   a. **Focus on the present task.** Stay alert. If you're tired or bored, accidents can easily happen.
   b. **Take time to do the job right.** Staying safe may take a little extra time, but it will result in fewer mistakes. Determine what needs to be done first so you won't run out of time on high priority tasks.
   c. **Use your head.** Do what you know is right. Don't take shortcuts or fool around. Also don't let emotions like anger or frustration get in the way of doing a good job.
   d. **Take responsibility for your actions and for your team.** Others trust and depend on you to do your job correctly. If you or your team do not act responsibly, others may suffer. Understand that safety is everyone's responsibility.
   e. **Avoid unnecessary risks.** Think of what could happen if you take a chance on an unsafe task. Many risks are dangerous and are not worth the chances.

3. a. Comply (follow, obey, etc.)
   b. Teacher or employer
   c. Unsafe conditions
   d. Personal protective equipment (safety glasses, gloves, etc.)
   e. First aid (help)
   f. Training
   (g and h do not require an answer)
   i. Clean or neat
   j. Horse around

Answers to Written Test

4. Any six of the following:

   a. Lighting is adequate to perform required duties and to prevent eyestrain.
   b. Air is clean, without harmful fumes.
   c. Seating and equipment encourage good body mechanics.
   d. Alarms are located to notify everyone in case of emergencies.
   e. Emergency exits are clearly marked, unlocked, and accessible.
   f. Fire extinguishers are readily available.
   g. Walkways are clear, barrier-free, and accessible to all.
   h. Safety rules are posted.
   i. Evacuation routes are posted.
   j. All students/employees receive safety training.
   k. Personal protective equipment is available for all.
   l. No smoking/smoking areas are designated.
   m. Adequate storage areas are provided for hazardous materials.
   n. Hazardous materials are clearly identified.

5. a. Motion
   b. Endurance
   c. Back
   d. Three
   e. Straight
   f. Relaxed, bent
   g. Slightly apart
   h. Ease
   i. As close to
   j. Hips
   k. Lower back
   l. Knees
   m. Firm
   n. Knees
   o. Leg
   p. While
   q. Injuries
   r. Ladders

6. Any four of the following:

   a. Fires
   b. Bombs and bomb threats
   c. Severe weather and natural disasters—Tornados, hurricanes, earthquakes, floods, etc.
   d. Accidents—Falls, cuts, burns, electrical shocks, poisonings, etc.
   e. Health problems—Heart attacks, strokes, seizures, heat exhaustion, etc.

Answers to Written Test

7. Discussions should include at least three of the following guidelines (in student's own words):

    a. When alarms (sirens) or warnings are issued by the local civil defense or national weather center, begin procedure to take cover.
    b. Move quickly and quietly to shelter area on the lowest level and in the interior of the building away from glass and outside openings.
    c. Sit down and protect yourself by putting your head as close to your lap as possible, or kneel down and cover your face and head with your arms.
    d. Answer to roll call if at school.
    e. Remain in designated area until the signal is given to return.

8. a. 1
    b. 2
    c. 4
    d. 5
    e. 3

9. a. (1) Pull the nearest fire alarm.
        (2) Close the doors around the fire to contain it.
        (3) Notify the building administrator or telephone operator (0 or 911) of the fire and its exact location.
    b. Any three of the following:

        (1) Remain calm and move quickly to exits. Do not use the elevators.
        (2) Close windows and doors as you leave your area. This limits the amount of oxygen the fire receives and prevents the spread of smoke.
        (3) Feel closed doors before opening them. Doors that are hot indicate a fire on the other side.
        (4) If you are unable to exit through the door and you must wait for rescue through windows, place wet cloths on the floor next to the door to prevent the spread of smoke into the room. A wet towel over the head will help if you must walk through smoke to an exit. DO NOT ENTER THICK SMOKE.
        (5) Once at the designated area, remain calm and stay with your group. All persons must be accounted for.

10. (Any order)
    a. Fuel
    b. Heat
    c. Oxygen

11. a. 3
    b. 1
    c. 2
    d. 4

Answers to Written Test

12. a. 3
    b. 5
    c. 2
    d. 1
    e. 4

13. Discussion should include at least seven of the following guidelines (in student's own words):

    a. Keep equipment clean and in good operating condition.
    b. Never overload electrical circuits.
    c. Store flammable/combustible materials in appropriate containers away from heat sources.
    d. Keep work and trash areas clean and free of debris.
    e. Dispose of flammables according to established safety guidelines.
    f. Never leave open flames unattended.
    g. Use caution when operating spark-producing equipment.
    h. Clean up spills (if appropriate) or report.
    i. Report suspicious persons (possible arsonists) to security or supervisory personnel.
    j. Keep fire exits/escape routes clear and well-marked.
    k. Know where fire alarm boxes are located.
    l. Know where fire extinguishers are located.
    m. Always be on the lookout for fires or conditions that could cause a fire and report them immediately.
    n. Properly dispose of cigarettes and matches.
    o. Always obey "no smoking" signs and areas.

14. a. Metal or water
    b. Cleaning, inspecting, repairing, or removing anything from them
    c. Sparks
    d. Clear (open)
    e. Flammable materials
    f. Circuit breakers
    g. Grounded
    h. Ground fault circuit interrupters (GFCIs)
    i. Water
    j. Any of the following:

       (1) Defective, frayed, or damaged cords
       (2) Shocking, sparking, overheating, or smoking equipment
       (3) Corroded or broken switches or outlets
       (4) Extension cords in permanent use

15. a. F
    b. F
    c. T
    d. F
    e. F
    f. T
    g. T
    h. F
    i. F
    j. T

Basic Safety
Unit 1-C

Written Test

Name ______________________________ Score ______________

1. Match the terms on the right with the correct definitions.

______a. Exercise practiced so that all members can demonstrate what to do in case of an emergency

______b. Capable of being easily ignited and burning quickly at temperatures below 100°F

______c. Unexpected event or circumstance resulting in loss or injury to the victim

______d. Death by electrical shock

______e. Making an electrical connection with the earth

______f. Capable of bursting into flames at temperatures above 100°F

______g. Moving people out of a disaster or dangerous area into a safe place

______h. Any accident or sudden illness that requires immediate intervention to prevent severe damage or death

______i. Physical state of equilibrium

______j. Material that allows the transmission of electricity

______k. Written record of the circumstances surrounding an unexpected event and the actions taken

1. Accident
2. Accident report
3. Alignment
4. Balance
5. Combustible
6. Conductor
7. Drill
8. Electrical shock
9. Electricity
10. Electrocution
11. Emergency
12. Evacuation
13. Flammable
14. Grounding
15. Insulator
16. Posture
17. Static electricity

Written Test

2. Discuss at least three ways of developing a good safety attitude.

____

____

____

____

____

____

____

3. Complete the following statements concerning personal safety guidelines by filling in the blanks with the correct answers.

   a. __________________ with all safety rules and posted signs.

   b. Follow instructions when performing a task. Ask questions of your __________________ if you do not understand.

   c. Correct or report all __________________ immediately.

   d. Wear __________________ as required.

   e. Report all accidents and get __________________ immediately.

   f. Never operate, adjust, or repair equipment without permission and proper __________________. Report defective equipment immediately.

   g. Use the correct tool or equipment for the job.

   h. Use proper body mechanics.

   i. Keep the work area __________________. Wipe up spills immediately. Dispose of supplies properly.

   j. Never "__________________" on the job. Don't play around with equipment in class or at work. Don't play jokes on others to distract them when they are working.

Written Test

4. List six expectations for a safe environment at school or work.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

   e. ______________________________

   f. ______________________________

5. Complete the following statements concerning the principles of body mechanics by circling the correct answers.

   a. Body mechanics is the use of the body to maintain balance and achieve (motion, energy).

   b. Using the body correctly results in better coordination and (cardiovascular efficiency, endurance).

   c. Using good body mechanics prevents body fatigue and injury, especially to the (legs, back).

   d. Maintaining good posture means keeping the (two, three) natural curves of your back in balance while standing, sitting, or lying down.

   e. For a good standing posture, keep your ears, shoulders, hips, knees, and ankles "stacked" in a (straight, curved) line.

   f. Your shoulders should be (tight, relaxed) and your knees (bent, locked).

   g. Standing with your feet (together, slightly apart) improves your balance.

   h. Alternately resting one foot on a foot stool can (ease, increase) strain on the back when standing for a long time.

   i. Stand (as close to, as far away from) the work area as possible to prevent reaching.

   j. For a good sitting posture "stack" ears over shoulders and shoulders over (hips, ankles).

   k. Place a lumbar roll between your (lower back, neck) and the back of your chair.

Written Test

l. For a good lying (or sleeping) posture rest on your side with knees slightly bent toward chest or on your back with a pillow placed under your (knees, feet).

m. Choose a (soft, firm) mattress for back support.

n. To lift correctly, bend at your (knees, hips).

o. Use your (back, leg) muscles for the actual "lifting."

p. *Never* turn or twist your body (before, while, after) lifting.

q. Body parts should be positioned correctly and exercised regularly when performing repetitive motions to prevent (injuries, boredom).

r. Use (ladders, chairs) to reach high objects.

6. List four basic types of emergencies.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

7. Discuss at least three severe weather guidelines.

____

____

____

____

____

____

____

Written Test

8. Arrange in order the steps to follow in case of a bomb threat by placing the correct sequence numbers (1-5) in the appropriate blanks.

______a. When you answer the call, obtain as much information as possible from and about the caller. Record the call if possible.

______b. Alert your instructor, supervisor, or building administrator immediately.

______c. A building search will be conducted by police bomb squad.

______d. An "All Clear" signal will be given when it is safe to return to the building.

______e. Begin building evacuation immediately.

9. Describe how to conduct a fire evacuation.

a. Upon discovery of a large fire or smoke or activation of a smoke detector, you should:

(1) ______________________________

(2) ______________________________

(3) ______________________________

b. Evacuate building as soon as alarm sounds in the following manner:

(1) ______________________________

(2) ______________________________

(3) ______________________________

10. List the three components of a fire.

a. ______________________________

b. ______________________________

c. ______________________________

Written Test

11. Match the classifications of fires on the right with their correct fuel sources.

_____a. Fires that occur in or near electrical equipment (wiring, appliances)

_____b. Fires that occur with ordinary combustible materials (wood, paper, trash)

_____c. Fires that occur with flammable liquids (gas, oil, paints)

_____d. Fires from combustible metals (magnesium)

1. Class A
2. Class B
3. Class C
4. Class D

12. Arrange in order the steps in using a fire extinguisher by placing the correct sequence numbers (1-5) in the appropriate blanks.

_____a. Aim the extinguisher nozzle at the base of the fire.

_____b. Sweep from side to side until the fire appears to be out. Watch the fire area.

_____c. Pull the pin. Some extinguishers require releasing a lock latch, pressing a puncture lever, or other step.

_____d. Identify the class of fire (A-D) and then make sure your fire extinguisher is coded to put out that type of fire. Check the label on the fire extinguisher.

_____e. Squeeze the handle. This releases the extinguishing agent.

13. Discuss at least seven ways to prevent fires.

a. ____

b. ____

c. ____

d. ____

e. ____

f. ____

g. ____

Written Test

14. Complete the following statements concerning electrical safety by filling in the blanks with the correct answers.

    a. Do not use any electrical appliance or equipment while you are touching ____________________.

    b. Unplug electrical equipment before ____.

    c. Keep electrical equipment and work areas clean to prevent electrical fires. Electrical ____________________ could ignite any flammable material nearby.

    d. Keep access to electrical panels and junction boxes ____________________.

    e. Keep ____________________ away from electrical heat sources, including lights.

    f. Know the location of fuses and ____________________.

    g. Make sure all electrical equipment is properly ____________________.

    h. Plug power tools into grounded outlets installed with ____________________.

    i. Never use ____________________ on electrical fires.

    j. Report any of the following unsafe conditions to your instructor or supervisor immediately and do not use: ____
    ____.

15. Select true statements concerning basic equipment safety by placing a "T" or "F" next to the true or false statements.

    ______a. Rings and other jewelry are allowed when operating power equipment if they are small.

    ______b. Cut off long hair and loose clothing such as ties, scarves, or wide sleeves when working around power equipment.

    ______c. Wear personal protective equipment (safety goggles, gloves, etc.) as required.

    ______d. Use equipment for any purpose if it seems more convenient.

    ______e. Use equipment without training if you think you know how to operate it.

    ______f. Inspect equipment before each use and replace or repair if parts are worn or damaged (if trained).

Written Test

_______g. Disconnect the power from equipment before performing any maintenance tasks (if trained).

_______h. Make sure power switch is turned to "ON" before plugging or unplugging.

_______i. Disconnect power by pulling on the cord.

_______j. Keep electrical cords out of traffic areas. Do not leave or store equipment that might be tripped over in aisles or traffic lanes.

***Permission to duplicate this test is granted.**

Basic Safety
Unit 1-C

Unit Evaluation Form

Student Name ______________________ Unit Rating __________

Assignment Sheet 1—Subscribe to a Safety Pledge Rating _____

Comments: ______________________________________

____

Assignment Sheet 2—Apply Safety Principles to the School and Workplace Rating _____

Comments: ______________________________________

____

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ______________________________________

____

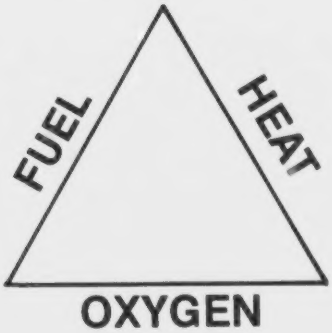
Teacher Signature ______________________ Date __________

Student Signature ______________________ Date __________

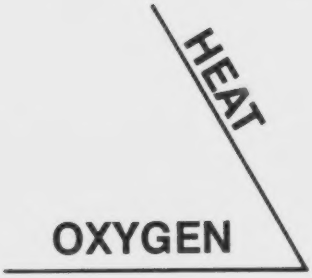
***Permission to duplicate this form is granted.**

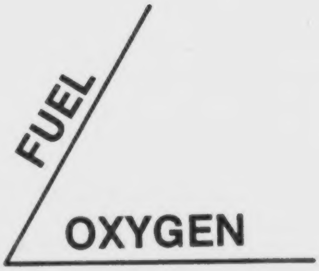
The Fire Triangle

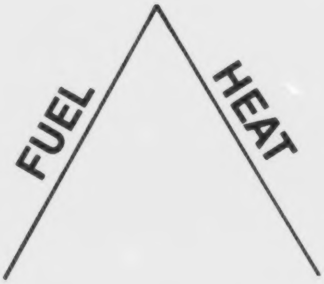
- To produce fire, three things must be present at the same time.


FUEL
HEAT
OXYGEN

- If any one of the three is missing, a fire cannot be started.
- If any one of the three is removed from a fire, the fire will be extinguished.

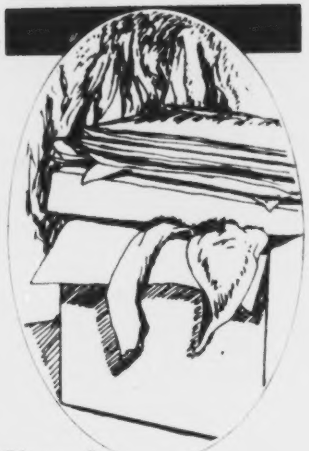

HEAT
OXYGEN


FUEL
OXYGEN

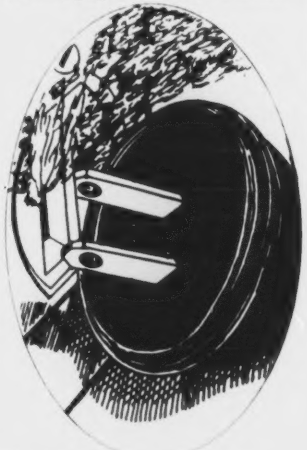


Classes of Fires

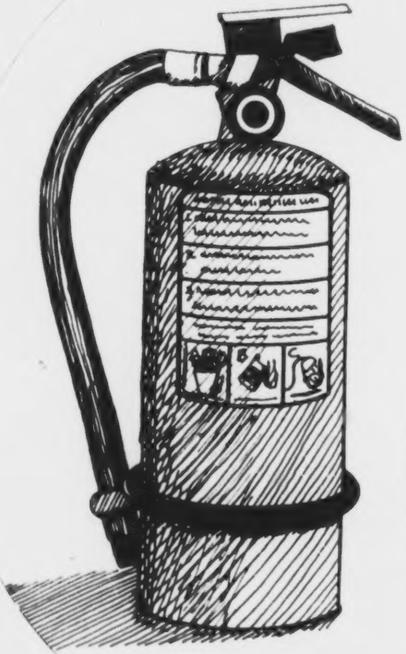
Be sure to use the right extinguisher for the type of fire you are confronting. Using the wrong extinguisher can actually make the fire worse.

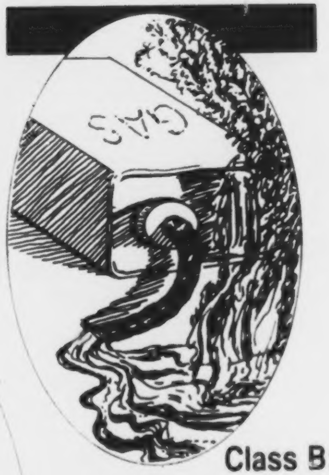


Class A:
Wood, paper, cloth, rubbish

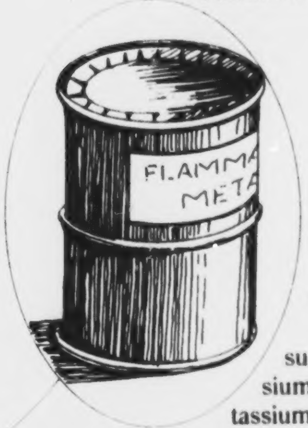


Class C: Electrical fires





Class B:
Flammable gas/liquids



Class D:
Combustible metals such as magnesium; sodium, potassium, and sodium potassium alloys require a special dry-powder, class D extinguisher.

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Basic Safety
Unit 1-C

Information Sheet

1. **Terms and definitions**

   a. **Accident** — Unexpected event or circumstance resulting in loss or injury to the victim

   b. **Accident report (incident report)** — Written record of the circumstances surrounding an unexpected event and the actions taken

   c. **Alignment** — Position of the body parts in relation to one another

   d. **Balance** — Physical state of equilibrium

   e. **Combustible** — Capable of bursting into flames at temperatures above 100°F

   f. **Conductor** — Material that allows the transmission of electricity

      Examples: Metals, carbons, water

   g. **Drill** — Exercise practiced so that all members can demonstrate what to do in case of an emergency

   h. **Electrical shock** — Sudden stimulation of the nerves and convulsive contraction of the muscles caused by the discharge of electricity through the body

      Note: This occurs when the human body closes an electrical circuit in which current flows. The shock may be macroshock through a large area of the body or microshock through a small area.

   i. **Electricity** — Fundamental entity of nature usually used as electrical current

   j. **Electrocution** — Death by electrical shock

   k. **Emergency** — Any accident or sudden illness that requires immediate intervention to prevent severe damage or death

   l. **Evacuation** — Moving people out of a disaster or dangerous area into a safe place

   m. **Flammable** — Capable of being easily ignited and burning quickly at temperatures below 100°F

   n. **Grounding** — Making an electrical connection with the earth

Information Sheet

o. **Insulator** — Material that does not allow the transmission of electricity

Examples: Glass, rubber, plastic

p. **Posture** — Position and alignment of the body

q. **Static electricity** — Electricity produced by friction

2. **Developing a good safety attitude**

Note: Developing a positive attitude toward safety can save your money, your job, and even your life! Don't think "it can't happen to me" because it does every day.

a. **Focus on the present task.** Stay alert. If you're tired or bored, accidents can easily happen.

b. **Take time to do the job right.** Staying safe may take a little extra time, but it will result in fewer mistakes. Determine what needs to be done first so you won't run out of time on high priority tasks.

c. **Use your head.** Do what you know is right. Don't take shortcuts or fool around. Also don't let emotions like anger or frustration get in the way of doing a good job.

d. **Take responsibility for your actions and for your team.** Others trust and depend on you to do your job correctly. If you or your team do not act responsibly, others may suffer. Understand that safety is everyone's responsibility.

e. **Avoid unnecessary risks.** Think of what could happen if you take a chance on an unsafe task. Many risks are dangerous and are not worth the chances.

3. **Personal safety guidelines**

a. Comply with all safety rules and posted signs.

b. Follow instructions when performing a task. Ask your teacher or employer questions if you do not understand.

c. Correct or report all unsafe conditions immediately.

d. Wear personal protective equipment (safety glasses, gloves, etc.) as required.

e. Report all accidents and get first aid immediately.

f. Never operate, adjust, or repair equipment without permission and proper training. Report defective equipment immediately.

Information Sheet

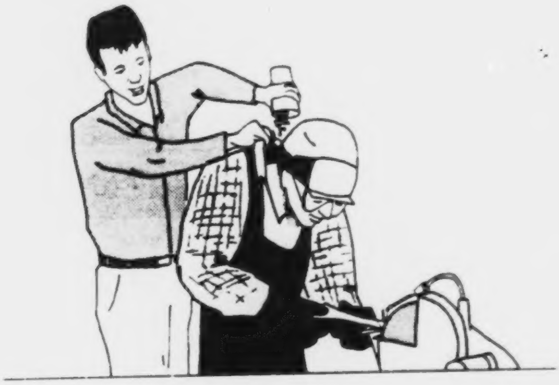
g. Use the correct tool or equipment for the job.

h. Use proper body mechanics.

i. Keep the work area clean and neat. Wipe up spills immediately. Dispose of supplies properly.

j. Never "horse around" on the job. Don't play around with equipment in class or at work. Don't play jokes on others to distract them when they are working.

Figure 1



Horseplay can cause accidents.

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4. Expectations for a safe environment at school and work

a. Lighting is adequate to perform required duties and to prevent eyestrain.

b. Air is clean, without harmful fumes.

c. Seating and equipment encourage good body mechanics.

d. Alarms are located to notify everyone in case of emergencies.

e. Emergency exits are clearly marked, unlocked, and accessible.

f. Fire extinguishers are readily available.

g. Walkways are clear, barrier-free, and accessible to all.

h. Safety rules are posted.

Information Sheet

i. Evacuation routes are posted.

j. All students/employees receive safety training.

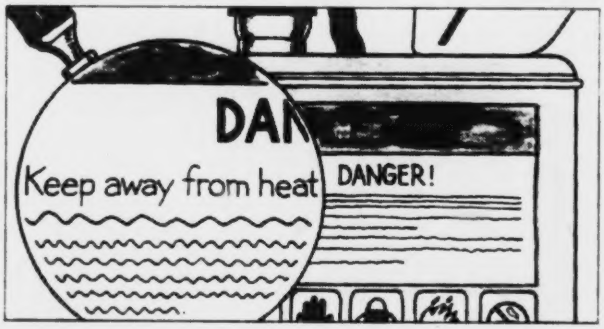
k. Personal protective equipment is available for all.

l. No smoking/smoking areas are designated.

m. Adequate storage areas are provided for hazardous materials.

n. Hazardous materials are clearly identified.

Figure 2



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Information Sheet

5. Principles of body mechanics

a. Body mechanics is the use of the body to maintain balance and achieve motion.

b. Using the body correctly results in better coordination and endurance.

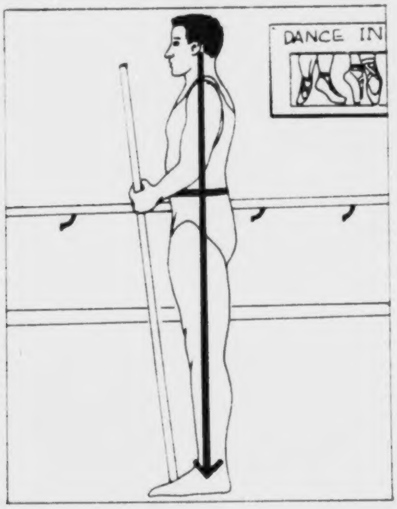
c. Using good body mechanics prevents body fatigue and injury, especially to the back.

d. Techniques for good body mechanics include maintaining good posture, lifting correctly, and moving correctly.

e. Maintaining good posture means keeping the three natural curves of your back (neck, chest, and lower back) in balance while standing, sitting, or lying down.

(1) Good standing posture—Keep your ears, shoulders, hips, knees, and ankles "stacked" in a straight line. Your shoulders should be relaxed and your knees slightly bent. Standing with your feet slightly apart improves your balance. Alternately resting one foot on a foot stool can ease strain on the back when standing for a long time. Stand as close to the work area as possible to prevent reaching. Adjust the height of the work area as necessary.

Figure 3



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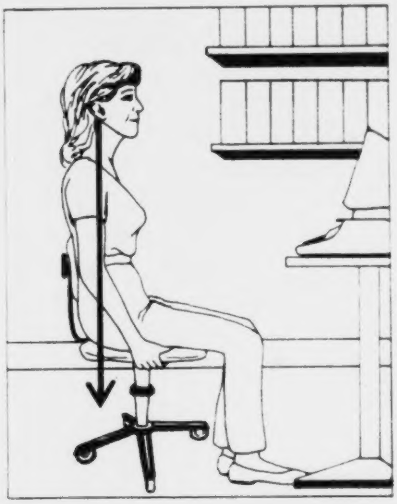
Information Sheet

(2) Good sitting posture—"Stack" ears over shoulders and shoulders over hips. Place a lumbar roll (or rolled up towel or sweater) between your lower back and the back of your chair. Keep your buttocks resting against the chair back, and your feet on the floor or footstool.

Figure 4



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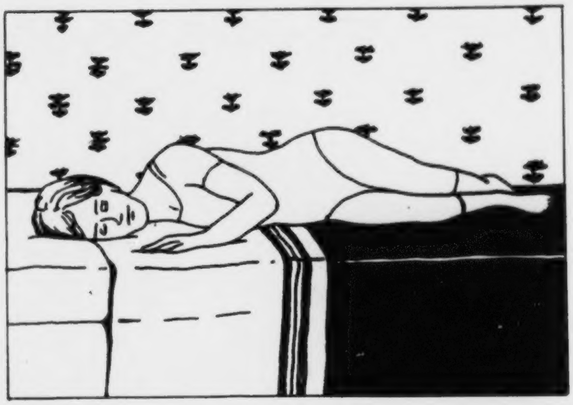
(3) Good lying (or sleeping) posture—Rest on your side with knees slightly bent toward chest (modified fetal position) or on your back with a pillow placed under your knees. Do not sleep with more than one pillow under your head which could exaggerate your neck curve and place undue stress on your back. Choose a firm mattress for back support.

Figure 5



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Information Sheet

f. Lifting correctly

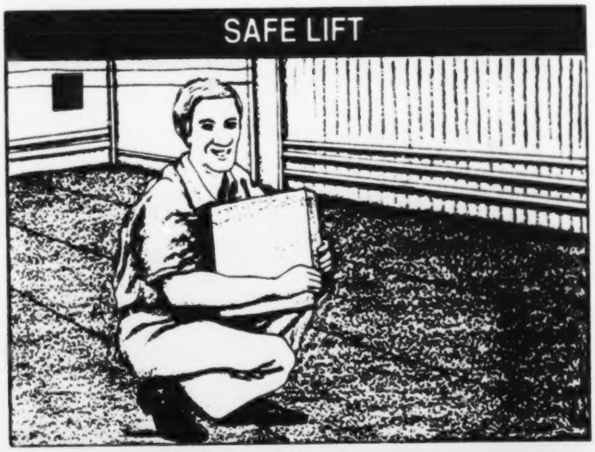
(1) Determine whether or not you can lift the object alone or need help.

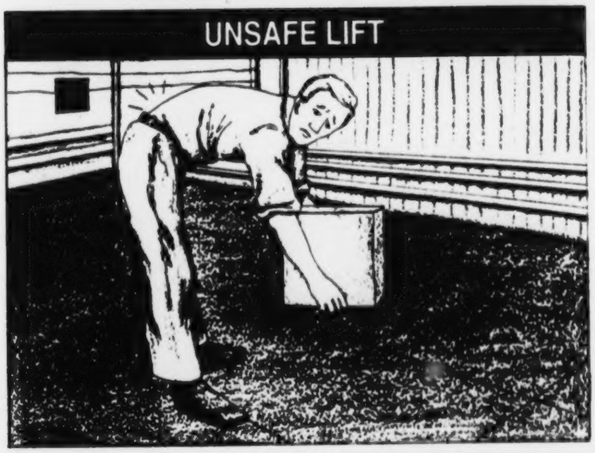
(2) Bend at your knees and hug the object close to you to maintain your back's correct alignment and your center of balance.

(3) Use your leg muscles for the actual "lifting."

(4) Never turn or twist your body while lifting. Make sure your feet, knees, and torso are pointed in the same direction when lifting. Turn with your feet after you have finished the lifting.

Figures 6 and 7





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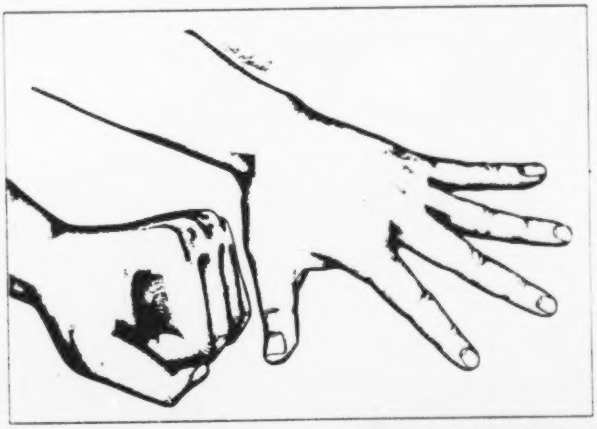
Information Sheet

g. Moving correctly

(1) Body joints should move freely through their entire range of motion.

(2) Body parts should be positioned correctly and exercised regularly when performing repetitive motions to prevent injuries such as carpal tunnel syndrome.

Figure 8



Hand Stretch

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(3) When moving an object, avoid lifting and carrying it whenever possible by using devices (such as carts, wheelchairs, or bed sheets) to slide, roll, or pivot the object.

(4) If you must carry a heavy or large object, have someone help you. Use teamwork to coordinate both of your movements. Both people should carry the object at the same level of the body and on the same side of the body.

(5) Use ladders to reach high objects. Do not use chairs or boxes as support. Do not over-reach or stretch to reach high objects.

Information Sheet

6. **Basic types of emergencies**

   Note: Knowing what to do and then acting quickly may lessen the damage or injury involved in the following emergencies.

   a. Fires

   b. Bombs and bomb threats

   c. Severe weather and natural disasters—Tornados, hurricanes, earthquakes, floods, etc.

   d. Accidents—Falls, cuts, burns, electrical shocks, poisonings, etc.

   e. Health problems—Heart attacks, strokes, seizures, heat exhaustion, etc.

      Note: Accidents and health emergencies should be handled by trained personnel. Your job may be to call for help.

7. **Severe weather guidelines**

   a. When alarms (sirens) or warnings are issued by the local civil defense or national weather center, begin procedure to take cover.

   b. Move quickly and quietly to shelter area on the lowest level and in the interior of the building away from glass and outside openings.

   c. Sit down and protect yourself by putting your head as close to your lap as possible, or kneel down and cover your face and head with your arms.

   d. Answer to roll call if at school.

   e. Remain in designated area until the signal is given to return.

8. **Steps to follow in case of a bomb threat or threatening telephone call**

   a. When you answer the call, obtain as much information as possible from and about the caller. Record the call if possible.

      Examples: Male, female, background noises, accent, voice characteristics

   b. Alert your instructor, supervisor, or building administrator immediately.

   c. Begin building evacuation immediately.

   d. A building search will be conducted by police/bomb squad.

   e. An "All Clear" signal will be given when it is safe to return to the building.

Information Sheet

9. Fire evacuation guidelines

a. Upon discovery of a large fire or smoke or activation of smoke detector, you should:

   (1) Pull the nearest fire alarm.

   (2) Close the doors around the fire to contain it.

   (3) Notify the building administrator or telephone operator (0 or 911) of the fire and its exact location.

b. Evacuate building as soon as alarm sounds in the following manner:

   (1) Remain calm and move quickly to exits. Do not use the elevators.

   (2) Close windows and doors as you leave your area. This limits the amount of oxygen the fire receives and prevents the spread of smoke.

   (3) Feel closed doors before opening them. Doors that are hot indicate a fire on the other side.

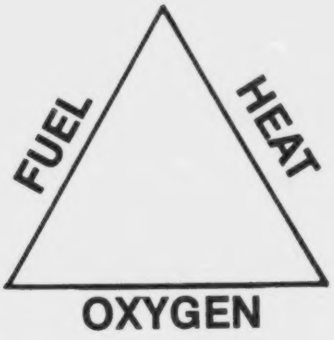
   (4) If you are unable to exit through the door and you must wait for rescue through windows, place wet cloths on the floor next to the door to prevent the spread of smoke into the room. A wet towel over the head will help if you must walk through smoke to an exit. DO NOT ENTER THICK SMOKE.

   (5) Once at the designated area, remain calm and stay with your group. All persons must be accounted for.

Information Sheet

10. Components of fire

Figure 9


FUEL
HEAT
OXYGEN

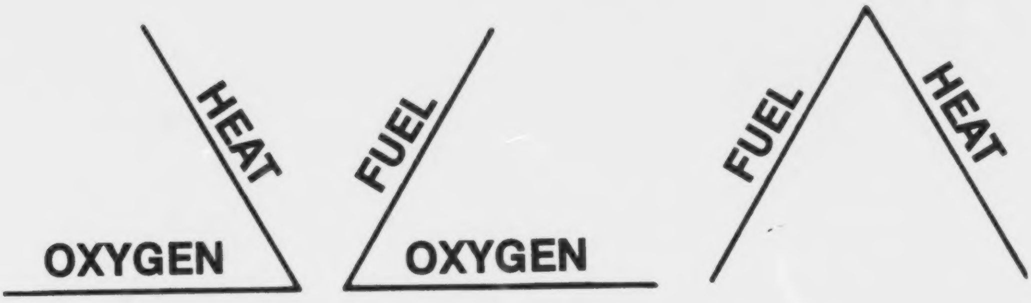
a. Fuel — Any combustible material

b. Heat — Enough to raise the fuel to its ignition temperature

c. Oxygen — Necessary to sustain combustion

Note: If any one of the three is missing, a fire cannot be started or, with the removal of any one of them, the fire will be extinguished.

Figure 10


HEAT
OXYGEN
FUEL
OXYGEN
FUEL
HEAT

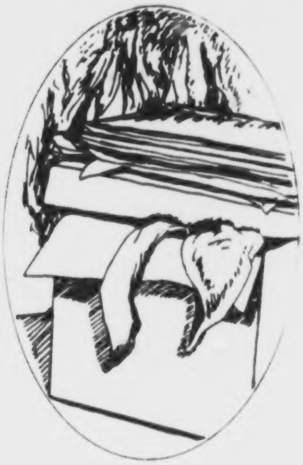
Information Sheet

11. **Classifications of fires (by their fuel source)**

    a. Class A — Fires that occur with ordinary combustible materials

    Examples: Wood, paper, trash, cotton bedding

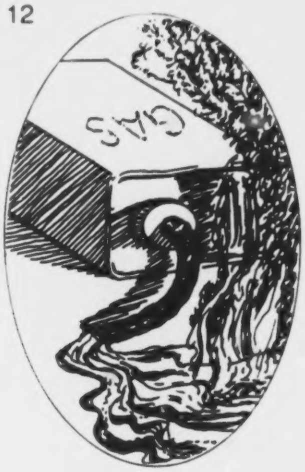
    Figure 11



    b. Class B — Fires that occur with flammable liquids

    Examples: Gasoline, oil, grease, paints, anesthetic agents

    Figure 12



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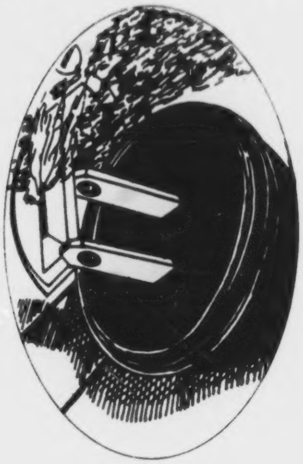
Information Sheet

c. Class C — Fires that occur in or near electrical equipment

Examples: Wiring, appliances, motors

Figure 13

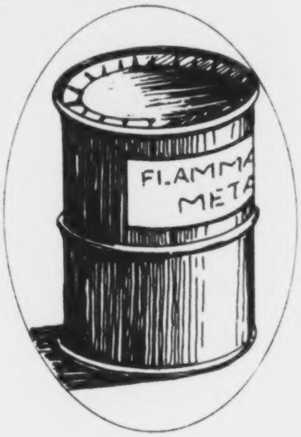


d. Class D — Fires from combustible metals

Examples: Magnesium; sodium, potassium, and sodium-potassium alloys

Note: These types of fires are more common in industrial settings. They require a special dry powder, Class D extinguisher.

Figure 14



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Information Sheet

12. Steps in using a fire extinguisher

Note: Most small fires can be put out before they become large fires if you use the correct extinguisher and act quickly. However, if you have any doubts about being able to control it, evacuate and get help instead of trying to extinguish it yourself.

a. **Identify** the class of fire (A-D) and then make sure your fire extinguisher is coded to put out that type of fire. Check the label on the fire extinguisher.

Note: The most common type of fire extinguisher is the multi-purpose A-B-C extinguisher which can be used on those three classes of fires. Some extinguishers will only put out one class of fire. Check to make sure.

b. **Pull** the pin. Some extinguishers require releasing a lock latch, pressing a puncture lever, or other step.

c. **Aim** the extinguisher nozzle (or its horn or hose) at the base of the fire.

d. **Squeeze** the handle. This releases the extinguishing agent (carbon dioxide or other chemical).

Caution: Do not touch the nozzle of the fire extinguisher. The CO_2 released is 130 degrees below zero which will burn the skin.

e. **Sweep** from side to side until the fire appears to be out. Watch the fire area. If fire breaks out again, repeat the process.

Note: One way to remember this sequence is the first letters of the steps spell "I/PASS". Most portable extinguishers work according to these directions. Follow the directions printed on the model you are using.

13. Ways to prevent fires

a. Keep equipment clean and in good operating condition.

b. Never overload electrical circuits.

c. Store flammable/combustible materials in appropriate containers away from heat sources.

d. Keep work and trash areas clean and free of debris.

e. Dispose of flammables according to established safety guidelines.

f. Never leave open flames unattended.

Information Sheet

g. Use caution when operating spark-producing equipment.

h. Clean up spills (if appropriate) or report.

i. Report suspicious persons (possible arsonists) to security or supervisory personnel.

j. Keep fire exits/escape routes clear and well-marked.

k. Know where fire alarm boxes are located.

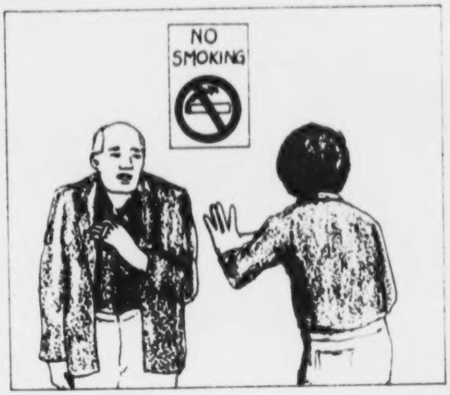
l. Know where fire extinguishers are located.

m. Always be on the lookout for fires or conditions that could cause a fire and report them immediately.

n. Properly dispose of cigarettes and matches.

o. Always obey "no smoking" signs and areas.

Figure 15



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Information Sheet

14. Electrical safety guidelines

Note: All electrical equipment is potentially hazardous and can cause fires, explosions, shocks, burns, and even death. Use with care.

a. Do not use any electrical appliance or equipment while you are touching metal or water.

b. Unplug electrical equipment before cleaning, inspecting, repairing, or removing anything from them.

c. Keep electrical equipment and work areas clean to prevent electrical fires. Electrical sparks could ignite any flammable material nearby.

d. Keep access to electrical panels and junction boxes clear.

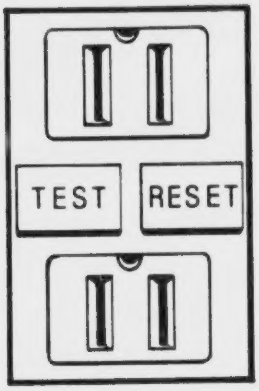
e. Keep flammable materials away from electrical heat sources, including lights.

f. Know the location of fuses and circuit breakers.

g. Make sure all electrical equipment is properly grounded.

h. Plug power tools into grounded outlets installed with ground fault circuit interrupters (GFCIs).

Figure 16



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Information Sheet

i. Never use water on electrical fires.

j. Report any of the following unsafe conditions to your instructor or supervisor immediately and do not use:

   (1) Defective, frayed, or damaged cords

   (2) Shocking, sparking, overheating, or smoking equipment

   (3) Corroded or broken switches or outlets

   (4) Extension cords in permanent use

15. Basic equipment safety guidelines

a. Remove rings and other jewelry when operating power equipment.

b. Secure long hair and loose clothing such as ties, scarves, or wide sleeves when working around power equipment.

c. Wear personal protective equipment (safety goggles, gloves, etc.) as required.

d. Use equipment only for its intended purpose.

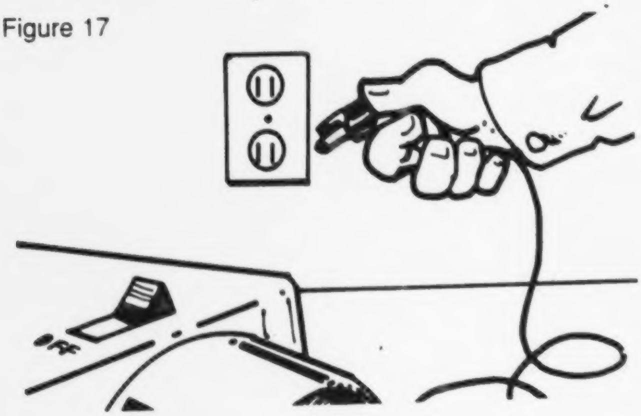
e. Never use any equipment unless you are trained to do so.

f. Inspect equipment before each use and replace or repair if parts are worn or damaged (if trained).

g. Disconnect the power from equipment before performing any maintenance tasks (if trained).

h. Make sure power switch is turned to "OFF" before plugging or unplugging.

Figure 17



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Information Sheet

i. Never disconnect power by pulling on the cord—remove the plug from the outlet. Make sure your hands are dry before disconnecting equipment from the power.

j. Keep electrical cords out of traffic areas. Do not leave or store equipment that might be tripped over in aisles or traffic lanes.

Basic Safety
Unit 1-C

Assignment Sheet 1—Subscribe to a Safety Pledge

Name ______________________________ Overall Rating ________

Evaluation criterion	**Rating**
Form is properly signed and dated	______

Directions: Read the following safety rules, and if you agree to follow them, sign the pledge and date it. Your parent's signature is also required if you are under their supervision.

SAFETY PLEDGE

______________________________, who is a student enrolled in surgical technology, will be in contact with surgical supplies and materials, power equipment, hazardous materials, and some physical dangers involving lifting and moving.

This student will receive instruction about safety and correct procedures to follow to protect them from danger.

The student must assume the responsibility for safe practices, and we therefore ask that she/he subscribe to the following safety pledge:

1. I AGREE TO ABIDE BY ALL OF THE SAFETY RULES IN THE SURGICAL TECHNOLOGY CLASSROOM/CLINICAL TEACHING FACILITY AND WILL MAINTAIN A PROFESSIONAL CONDUCT THAT IS IN KEEPING WITH THIS PROFESSION.

2. I PLEDGE THAT I WILL TAKE PROPER CARE OF ANY EQUIPMENT THAT IS ISSUED TO ME OR THAT I USE IN CLASS/CLINICAL WORK, AND I AGREE TO RETURN IT TO ITS PROPER STORAGE LOCATION.

3. I WILL REPORT ANY UNSAFE SITUATIONS, EQUIPMENT, OR ACCIDENTS TO THE INSTRUCTOR/SUPERVISOR IMMEDIATELY.

Student's Signature ______________________________ Date ____________

I hereby give consent to allow my daughter/son to operate all equipment necessary in carrying out the requirements of the course.

Parent's (Guardian's) Signature ______________________________ Date ____________

Basic Safety
Unit 1-C

Assignment Sheet 2—Apply Safety Principles to the School and Workplace

Name ______________________ Overall Rating __________

Evaluation criterion	**Rating**
Answers are appropriate	______
Descriptions are complete with correct grammar, spelling, and punctuation	______

Directions: Answer the following questions concerning safety in your school and at the clinical site. Be as specific as possible. Refer to your school handbook or information from you instructor and the "Policies and Procedures Manual" for your medical facility.

1. PERSONAL PROTECTIVE EQUIPMENT (AND ATTIRE)

   a. What personal protective equipment (and attire) are you required to wear at school?

   ____

   b. What at work? ______________________________________

   ____

   c. Under what situations will the requirements vary? ____________________

   ____

2. SAFETY PROCEDURES TO FOLLOW

   a. What should you do if you see an accident happen at school? __________

   ____

   ____

   b. Accident at work? ______________________________________

   ____

   ____

Assignment Sheet 2

c. What should you do if you are the first to discover a small fire at school? ____

d. Small fire at work? ____

e. What should you do if you are the first to discover a large fire at school? ____

f. Large fire at work? ____

g. What should you do if you answer the telephone at school and it is a bomb threat?

h. Bomb threat at work? ____

i. What should you do if you hear the severe weather alert (civil defense sirens or alarms) while you are at school? ____

j. Severe weather alert at work? ____

Assignment Sheet 2

3. BODY MECHANICS

   a. What is the correct way to lift a large, heavy object? ____________________

   ____

   ____

   ____

   b. What do you think is the **most** important thing to remember when lifting?

   ____

4. SAFETY ATTITUDE

   a. What can you lose if you don't follow the safety rules and established procedures at school and work?

   ____

   ____

   b. Select an accident that you have had, or one that you have seen, and describe what could have been done to prevent it.

   ____

   ____

   c. How would you feel if you lost your eyesight in an accident that could have been prevented? How would that accident change your life?

   ____

   ____

Workplace Safety
Unit 2-C

Objective Sheet

Unit Objective

After completing this unit, the student should be able to discuss ways to safely use various equipment required in the healthcare workplace, use material safety data sheets, and discuss and apply Universal Precautions. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to workplace safety with their correct definitions.
2. List types of hazardous materials found in the healthcare workplace.
3. Describe OSHA regulations required of employers.
4. Select true statements concerning hazard communication.
5. Describe information on a chemical label.
6. Match information on a material safety data sheet (MSDS) with the correct descriptions.
7. Complete statements concerning bloodborne pathogens.
8. Select true statements concerning the characteristics of hepatitis.
9. Complete statements concerning the characteristics of HIV and AIDS.
10. Discuss Universal Precautions.
11. Complete statements concerning the characteristics of radiation.
12. Describe radiation safety considerations.
13. List flammable anesthetic gases.
14. Match cylinders of compressed gases with their correct standard tank colors.
15. Select from a list the common fire ignition sources in the operating room.
16. Match types of burns with their correct descriptions.
17. Discuss possible causes of patient thermal burns.

Objective Sheet

18. Select true statements concerning static electricity.
19. Complete statements concerning the grounding of electrical equipment.
20. Match the components of an electrosurgery unit with their correct descriptions.
21. Distinguish between the types of electrosurgery units.
22. Select true statements concerning safeguards for using electrosurgery units.
23. Discuss safeguards for preventing electrical and fire hazards.
24. Discuss precautions for using lasers.
25. Locate information about chemicals using an MSDS. (Assignment Sheet 1)
26. Apply Universal Precautions to the workplace. (Assignment Sheet 2)

Workplace Safety
Unit 2-C

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make a transparency from the transparency master included with this unit. This appears in the teacher edition only and is designed to be used with the following objective:

   TM 1—MSDS Example (Objective 6)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Suggested Activities

Evaluation

12. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

13. Make copies of the written test. Add or modify test items as needed.

14. Give written test.

15. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments or supplemental activities that should be part of the unit evaluation.

16. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Show videotapes relating to workplace safety and Universal Precautions. Refer to the addresses in the Suggested Supplemental Resources. **Communication skills**

2. Provide examples of actual chemical labels, and have students locate the information contained. You could develop quizzes over the labels available in the classroom/clinical setting. **Foundation reading and writing skills**

3. Provide examples of actual MSDSs of chemicals the students will be using in the operating room. You could add to those assigned in Assignment Sheet 1 over additional MSDS available in the classroom/clinical setting. **Foundation reading and writing skills**

4. Test your students understanding of Universal Precautions by making up realistic situations that could occur in the operating room, and have students identify (orally or written) what Universal Precautions should be followed in each case. **Communication skills, problem-solving skills**

5. Invite an anesthesia representative to discuss with your class the anesthetic gases and what to do in case of a fire in the patient's airway. **Communication skills, problem-solving skills**

6. Have an inservice on electrosurgery safety. Discuss safe use and grounding. **Communication skills**

Suggested Activities

7. Discuss fire hazards in the operating room. Relate to the class actual fires you have seen or been involved in. Discuss the after effects of the fire (legal, financial, and emotional). **Communication skills**

8. Show actual warning signs for radiation and lasers.

9. Contact the Centers for Disease Control in Atlanta, Georgia, for the latest up-to-date information about AIDS and Universal Precautions.

Resources Used in Developing This Unit

1. Atkinson, Lucy Jo. *Berry and Kohn's Operating Room Techniques*, 7th ed. St. Louis: C. V. Mosby Year Book, 1992.

2. Dock, Nancy L. "The ABC's of Viral Hepatitis." *Clinical Microbiology Newsletter*, Vol. 13, No. 3. New York: Elsevier Science Publishing Co., Inc., February 1, 1991.

3. Feorino, Paul. "Universal Precautions and the Transmission of Hepatitis B and HIV." *Clinical Microbiology Newsletter*, Vol. 14, No. 3. New York: Elsevier Science Publishing Co., Inc., 1992.

4. Meeker, Margaret Huth and Jane C. Rothrock. *Alexander's Care of the Patient in Surgery*, 9th ed. St. Louis: Mosby Year Book, Inc., 1991.

5. Norris, Jack. "Fire Safety in the Operating Room." *Today's O.R. Nurse*. March 1992.

6. *Safety and Health*. San Francisco: Parlay International, 1988.

Suggested Supplement Resources

1. Software

   a. *Universal Precautions Update*. Reviews bloodborne illness transmission and the use of barrier precautions.© 1992.

   b. *Electrical Safety in the Healthcare Setting*. Covers the basic principles of electricity and dos and don'ts for healthcare employees who routinely use electrical equipment.© 1993.

   a and b are available from:

   Computerized Educational Systems
   307 Park Lake Circle
   P.O. Box 536905
   Orlando, FL 32853-6905
   800-275-1474

Suggested Activities

2. Poster--"Bloodborne Pathogens", 18″ x 24″, color. Available from:

   Coastal Health Care
   3083 Brickhouse Court
   Virginia Beach, VA 23452
   800-729-4325 or 804-498-3560

3. Training manuals

   a. *Bloodborne Pathogens.* National Safety Council training program designed for students entering health-related fields. 12 chapters. Instructor's package also includes a 20-minute video, slide set, and resource manual. Available from:

      Jones and Bartlet Publishers, Inc.
      One Exeter Plaza
      Boston, MA 02116
      800-832-0034 or 617-859-3900

   b. *Universal Precautions: AIDS and Hepatitis B Prevention for Healthcare Workers.*© 1992. Video-print package that covers five lessons--Bloodborne Infections, Transmission of Bloodborne Infection, Exposure Control, Using Personal Protective Equipment, and Work Practice Controls. Video is 33 minutes, workbook is 40 pages. Available from:

      Medcom/Trainex
      P.O. Box 3225
      Garden Grove, CA 92641
      800-877-1443 or 714-891-1443

   c. *Bloodborne Infections: A Practical Guide to OSHA Compliance.* 1992. Discusses OSHA final rulings on bloodborne pathogens, and guidelines for compliance for healthcare professionals.

   d. *Protect Thyself ... The OSHA Way.* 1993. 17-minute videotape and study guide look at three vital areas--Engineering Controls, Work Practice Controls, and Personal Protective Equipment.

   3c and d are available from:

   Johnson & Johnson Medical Inc.
   Professional Education and Services
   P.O. Box 130
   Arlington, TX 76004-0130
   817-784-4962

Suggested Activities

4. Videotapes

   a. *A Line of Defense--Viral Precautions in the OR*, 1992, 15 minutes.

   b. *Potential Electrical Hazards in the Operating Room*, 1973, 20 minutes.

   4a and b are available from:

   Cine-Med Distribution Center
   Davis + Geck Video Library
   P.O. Box 745
   Woodbury, CT 06798
   800-633-0004

   c. *The Hazards of Surgical Smoke*, videotape and workbook designed to protect the surgical team from the smoke generated during electrosurgery and laser procedures. Available from:

   Stackhouse Educational Services
   2059 Atlanta Avenue
   Riverside, CA 92507-9869
   800-325-0082

   d. *Bloodborne Pathogens in the Workplace: For Healthcare Facilities*, 19 minutes. Provides information about Hepatitis B and HIV, defines "parenteral exposure," discusses the exposure control plan, explains labeling of potentially infectious materials, and outlines the OSHA regulations. Available from:

   AIMS Media
   9710 DeSoto Avenue
   Chatsworth, CA 91311-4409
   800-367-2467

   e. *Chemical Hazards: Your Right to Know*, 12 minutes. Covers basic introductory information to hospital staff about the right-to-know law, warns workers about chemical hazards in the workplace, and examples of protective equipment and procedures. Available from:

   Sacred Heart Medical Center
   c/o Care Video Productions
   1650 Crossings Parkway
   Westlake, OH 44145

Suggested Activities

f. *Hazard Communication: Learning the System*, 17-minute videotape. Workbooks and OSHA Compliance manual are also available.

g. *Understanding Chemical Labels*, 12-minute videotape.

h. *The MSDS and You*. 12-minute videotape. Workbooks are also available.

4f - h are available from:

International Film Bureau Inc.
332 South Michigan Avenue
Chicago, IL 60604-4382
800-432-2241

i. *Inservice Fire Safety Within the Hospital Setting*, 28-minute videotape that discusses what to do when fire occurs in patient care areas.

j. *Why Take the Risk? Sharps Safety*, 18-minute videotape that covers preventive procedures and treatment when a needle puncture occurs. Incorporates Universal Precautions.

k. *AIDS and the Health Care Provider*, 19-minute videotape designed to reduce fear about AIDS. Covers CDC guidelines for isolating the AIDS virus, not the AIDS patient.

l. *No Time to Waste*, 28-minute videotape that discusses hazardous waste management.

m. *Any Questions? The Universal Precautions Explained*, 15-minute videotape that addresses general questions and specific questions for different areas in the hospital.

4i - m are available from:

American Journal of Nursing Company
Educational Services Division
555 West 57th Street
New York, NY 10019-2961
800-CALLAJN (235-5256)

Suggested Activities

n. *Bloodborne Pathogens Series* (comply with OSHA's Bloodborne Pathogens Standard)
    (1) *The Bloodborne Pathogen Standards*, 20 minutes.
    (2) *Medical Waste Handling*, 20 minutes.
    (3) *Needle Stick Prevention*, 18 minutes.
    (4) *Exposure Control Manual*, 150 pages.

o. *Hazard Communication*, 17 minutes.

p. *Healthcare Electrical Safety*, 18 minutes.

q. *Managing Healthcare Stress*, 17 minutes.

r. *Drug-Free Workplace*, 15 minutes.

s. *Healthcare Radiation Safety*, 18 minutes.

t. *Formaldehyde Safety*, 15 minutes.

4n - t are available from:

Coastal Health Care
3083 Brickhouse Court
Virginia Beach, VA 23452
800-729-4325 or 804-498-3560

5. *Electrosurgery Safety Seminar*, 1991. 20 minutes, pre and post tests. Only available through 3M representatives. Order number: C-302 (1/2" video) Call: 3M Health Care Customer Service at 800-327-5380.

Workplace Safety
Unit 2-C

Answers to Assignment Sheets

Assignment Sheet 1—Evaluate according to MSDS available in classroom.

Assignment Sheet 2

1. d
2. c
3. c
4. b
5. d
6. F
7. F
8. T
9. F
10. T
11. Potentially infectious
12. Wash your hands
13. Placing them in closable puncture-resistant container
14. Resuscitation bags
15. 6-30
16. 24 hours
17. Answers vary. HIV is more deadly, but hepatitis B is more contagious. Students could argue either way.
18. Through blood and body fluids, by sexual contact, or by perinatal or parenteral entry

Answers to Assignment Sheets

19. Receive hepatitis B vaccine, use Universal Precautions, do not share needles (drug users), practice "safe" sex, do not touch others' blood or body fluids, wash hands frequently, and educate others about these dangers.

20. The federal government acts as a central information center for obtaining and distributing information about bloodborne pathogens. Each state only knows about itself.

Workplace Safety
Unit 2-C

Answers to Written Test

1.

a.	10	h.	14
b.	9	i.	3
c.	2	j.	8
d.	5	k.	7
e.	12	l.	6
f.	1	m.	4
g.	13		

2. Any three of the following:

   a. Body fluids containing infectious materials
   b. Sharp instruments or supplies
   c. Flammable gases
   d. Radiation/radioactive substances
   e. Electrical equipment
   f. Chemicals

3. Any three of the following:

   a. To provide written policies and training for the safe use, handling, dispensing, and storing of hazardous materials
   b. To follow CDC guidelines on infection control
   c. To provide protection from high noise levels
   d. To provide adequate ventilation systems
   e. To minimize radiation exposure
   f. To meet standards for fire and electrical safety
   g. To provide training in laser safety

4. a. F
   b. T
   c. F

5. Any four of the following:

   a. Chemical name and ingredients
   b. Name, address, and phone number of the manufacturer or distributor
   c. Procedures for usage, handling, storage, and disposal
   d. How to handle spills and leaks
   e. Signal words identifying chemical as hazardous

      (1) Caution—Least severe
      (2) Warning—Very severe
      (3) Danger—Most severe

Answers to Written Test

f. Critical first aid instructions and type of fire extinguisher to use
g. Personal protective equipment to wear when using the chemical
h. Other information about the chemical

   (1) Flammability
   (2) Radioactivity
   (3) Reactivity—Uses words "incompatible," "instable," and "volatile"
   (4) Toxicity

6. a. 5
   b. 3
   c. 1
   d. 8
   e. 4
   f. 7
   g. 6
   h. 2

7. a. Disease
   b. Deadly
   c. HIV
   d. Any one of the following: Semen, vaginal secretions, breast milk, and cerebrospinal fluid, as well as tissue cultures.
   e. Infected
   f. Universal Precautions
   g. Potentially infectious

8. a. F
   b. F
   c. T
   d. F
   e. T
   f. F
   g. F
   h. T
   i. T

9. a. Immune
   b. Years
   c. Any one of the following: Opportunistic infections, malignancies, and neurologic diseases
   d. Cure or vaccination
   e. Any one of the following: Former patients who received blood or blood products contaminated with HIV, sexual partners of HIV+ or AIDS patients, injectable-drug users
   f. 24 hours
   g. 1000
   h. 1

Answers to Written Test

10. Discussion should include: (in student's own words)

    a. **Barrier techniques**—Wear barrier protective equipment to prevent skin and mucous membrane contact with blood and body fluids.

        (1) Gloves
        (2) Masks
        (3) Eyewear and face shields
        (4) Gowns or aprons (impermeable)

    b. **Handwashing**—Wash hands thoroughly following every contact with blood, a patient, and items in contact with blood and body fluids. Wash hands after removing gloves.

    c. **Sharps precautions**—All cutting instruments and needles present a potential hazard for the user as well as the handler.

        (1) Use instruments to attach a knife blade.
        (2) Keep needles on needleholders.
        (3) DO NOT RECAP NEEDLES.

            Note: If re-capping needles is required by a specific medical procedure, **DO NOT** use a two-handed manual technique.

        (4) Place sharps in an easily accessible, closable, puncture-resistant container.

11. a. Diagnosis or treatment of cancer
    b. Limited
    c. Length of time
    d. Any one of the following: Anorexia, headache, nausea, vomiting, or diarrhea
    e. Any one of the following: Amenorrhea, sterility, disturbances in blood cell formation, cataracts, carcinogenesis, or leukemia
    f. Purple propeller

12. a. Any two of the following:

        (1) Shield body areas from scatter radiation.
        (2) Take an X-ray for lost sponge or needle only after a thorough search has been made to eliminate radiation exposure.
        (3) Turn off fluoroscope and other equipment when not in use.
        (4) Use lead shields to protect the fetus of a pregnant patient.

Answers to Written Test

b. Any two of the following:

  (1) Rotate assignments on procedures that involve radiation when possible.
  (2) Turn off machines when not in use.
  (3) Leave radioactive elements in lead-lined containers until ready to use.
  (4) Use protective shields and equipment when necessary.
  (5) Use a monitoring device to measure accumulated exposure to radiation.

13. Any two of the following:

  a. Cyclopropane
  b. Divinyl ether
  c. Ethyl ether
  d. Ethyl chloride
  e. Ethylene

14. a. 2
  b. 6
  c. 5
  d. 3
  e. 4

15. c, d, f

16. a. 4
  b. 2
  c. 1
  d. 3

17. Any two of the following:

  a. Malfunctioning, heat-generating devices in contact with the patient
  b. Pooling of prep solution under the patient when using electrocautery
  c. Using alcohol sponges when using electrocautery
  d. Using phenol as a marking agent or a prep solution
  e. Using hyperthermia unit with mattress above 140°F
  f. Physical fire

18. a. F
  b. F
  c. T
  d. T
  e. T
  f. T
  g. T
  h. F

Answers to Written Test

19. a. Any one of the following: Heart monitors, defibrillators, X-ray machines, electrosurgical units, or electrical saws or drills
    b. Ground wire
    c. Any one of the following: Broken or frayed cords or plugs or defective equipment

20. a. 2
    b. 1

21. a

22. a. F
    b. T
    c. T
    d. F
    e. T
    f. T

23. a. Any five of the following:

    (1) Wear proper operating room attire and conductive shoe covers.
    (2) Cover all hair to prevent electrostatic sparks.
    (3) Never use open flames in the operating room.
    (4) Never move a patient from one area to another while a flammable anesthetic is being administered.
    (5) Properly ground a patient before using electrosurgical unit.
    (6) Always check electrical cords and wires for fraying and breakage before using.
    (7) Never use a piece of electrical equipment without having been taught the proper method of usage.
    (8) If equipment appears damaged or malfunctioning, immediately discontinue its use and send for repair.
    (9) Avoid unnecessary motion around the patient's head and the anesthesia machine.
    (10) Turn off all electrical equipment when it is no longer needed.

    b. Any five of the following:

    (1) Air conditioning with controlled humidity should be used in all operating rooms to reduce explosion hazards, provide comfort for the patient and personnel, and help control airborne bacteria.
    (2) The range of temperature used varies from 60°F-80°F with the average around 70°F.
    (3) Humidity should be 55-60%. This atmosphere minimizes static electricity build-up in the presence of flammable anesthetic agents.
    (4) Air conditioning must function properly and air intakes and exhausts must be installed in designated places to provide proper ventilation and filtration. The farther apart, the better. This aids in the prevention of pockets of gas in the room.

Answers to Written Test

(5) Positive static pressure, which is the greater air pressure in the operating room in relation to the lesser pressure outdoors, is used in the O.R. to provide a one-way directional laminar air flow for the prevention of the outside intake of airborne microorganisms and the accumulation of static electricity.
(6) Operating room doors should be kept closed in order to maintain a positive static pressure.
(7) O.R. furniture should be made of metal or conductive rubber.
(8) Only cotton blankets and sheets should be used in the operating room because wool, silk, nylon, and synthetic materials have static potential.
(9) All electrical receptacles (outlets and switches) must be 5′ above the floor or be explosion-proof.
(10) Anesthesia machines, cylinders of compressed gas, and flammable liquid containers must be kept away from sources of heat and must not touch each other.

24. a. Any two of the following:

(1) Noncombustible anesthetic agents should be used.
(2) Endotracheal tubes should be properly protected (insulated or wrapped with reflective aluminum or copper tape)
(3) Patient's eyes should be protected.
(4) Nonflammable antiseptic should be used for skin preparation.
(5) Skin surrounding incision and/or target tissue should be protected from possible thermal burn.
(6) Postoperative instructions should include care of healing thermal wound if on the skin.

b. Any two of the following:

(1) Wear proper eye protection.
(2) Protect skin.
(3) Avoid inhalation of laser plume.

c. Any two of the following:

(1) Warning signs should be posted on all doors.
(2) Walls and ceilings should have non-reflective surfaces.
(3) Warning labels must indicate points of danger to avoid personnel exposure to laser radiation.
(4) Check machine for proper functioning. Any malfunction should prohibit use until repaired.
(5) Machine should be kept on "standby" setting when not in use during the surgical procedure.
(6) Monitor the laser foot switch.
(7) Use nonreflective instruments.

Answers to Written Test

(8) A basin of sterile water should be available in case of fire.
(9) Electrical codes must be enforced.
(10) Follow manufacturers' instructions for operation, care, handling, and sterilization procedures.

Workplace Safety
Unit 2-C

Written Test

Name ________________________________ Score ______________

1. Match the terms on the right with the correct definitions.

______a. Federal legislation designed to ensure safe and healthful working conditions for employees

______b. Form that lists and explains hazardous materials that an employee works with so the employee can safely use the material and respond to emergency situations

______c. Using a high frequency electric current to cut or coagulate tissue

______d. Fluorescent light reproducing optical images of body structures onto a screen

______e. X-rays that have changed direction because of a collision with an object

______f. Division of the U.S. Public Health Service for investigation and control of various diseases, especially those that have epidemic potential

______g. Protective barrier of lead to stop radiant energy

______h. Guidelines recommended by the CDC to prevent the transmission of bloodborne pathogens

______i. Surgical procedures in which electricity is required either in the actual surgical apparatus or in the application of electrocautery

1. CDC
2. Electrocautery
3. Electrosurgery
4. Exposure
5. Fluoroscope
6. Hazardous material
7. Infectious disease
8. Laser
9. MSDS
10. OSHA
11. Regulated waste
12. Scatter radiation
13. Shield
14. Universal Precautions
15. X-rays

Written Test

_______j. Device that uses the natural oscillations of atoms or molecules between energy levels for generating coherent electromagnetic radiation in the ultraviolet, visible, or infrared regions of the light spectrum

_______k. Any disease caused by growth of pathogenic microorganisms in the body

_______l. Any dangerous substance that has the potential for damaging effects on specific body organs

_______m. Amount of radiation being delivered or received over a given area or to the entire body

2. List three types of hazardous materials found in the healthcare workplace.

   a. ____

   b. ____

   c. ____

3. Describe at least three OSHA regulations required of employers.

   ____

   ____

   ____

   ____

   ____

   ____

Written Test

4. Select true statements concerning hazard communication by placing a "T" or "F" next to the true or false statements.

______a. OSHA established the HazCom Standard to protect the legal rights of employers.

______b. The HazCom Standard ensures your "right to know" about potentially dangerous chemicals in the workplace.

______c. OSHA only requires employers to develop an oral HazCom program.

5. Describe at least four types of information on a chemical label.

____

____

____

____

____

____

6. Match information on a material safety data sheet (MSDS) on the right with the correct descriptions.

______a. Describes usual or safe qualities such as how it looks or smells, boiling and melting temperatures, evaporation rates, how easily it dissolves, and how heavy it is (compared to water)

______b. Includes names of substances in the chemical that might be dangerous, safe exposure limits, and common names for the chemical

______c. Lists the identity of the substance, the date the MSDS was prepared, name and address of the manufacturer, and usually a phone number for emergencies

1. Chemical name
2. Fire and explosion data
3. Hazardous ingredients/chemical identity
4. Health hazards
5. Physical characteristics
6. Reactivity

Written Test

_____d. Describes how to clean up an accidental spill, leak, or release, including special precautions. Tells how to handle, store, and dispose of chemical safely.

_____e. Lists ways the chemical might enter your body, symptoms of overexposure, and emergency first aid procedures

_____f. Explains special personal protective equipment and other equipment to use when working with the chemical and extra health and safety information not covered in other sections

_____g. Describes what happens if this chemical comes in contact with certain conditions or chemicals

_____h. Identifies flash point, flammability, combustibility, and the best way to put out a fire involving that chemical

7. Special protection and precautions

8. Usage, handling, and storage

7. Complete statements concerning bloodborne pathogens by filling in the blanks with the correct answers.

    a. Bloodborne pathogens are microorganisms in the bloodstream that can cause _______________.

    b. These are the greatest health concern today because the pathogens can be _______________.

    c. They include malaria; syphilis; hepatitis B, C, and D; and _______________.

    d. Bloodborne pathogens are found in _______________.

    e. In order for an infection to take place, both the source blood must be _______________, and that blood must enter into your bloodstream.

    f. _______________ must be followed to prevent infection from bloodborne pathogens.

    g. Since you cannot tell by looking if the source blood is contaminated, all blood and body fluids must be treated as _______________.

Written Test

8. Select true statements concerning the characteristics of hepatitis by placing a "T" or "F" next to the true or false statements.

_______a. Hepatitis is an inflammation of the brain.

_______b. There are ten types of hepatitis viruses.

_______c. Hepatitis B is the major infectious bloodborne hazard faced on-the-job by healthcare workers.

_______d. An estimated ten million people in the United States are infected with hepatitis B virus annually.

_______e. 1 ml of contaminated blood contains 1 billion hepatitis B virus parts.

_______f. Hepatitis B virus lives up to 1 month (30 days) on dry surfaces.

_______g. Healthcare workers are at no greater risk of contracting HBV than the normal public.

_______h. The risk of acquiring hepatitis B from a needlestick injury with hepatitis B contaminated blood is 6% to 30%.

_______i. All healthcare workers should receive the hepatitis B vaccine.

9. Complete statements concerning the characteristics of HIV and AIDS by filling in the blanks with the correct answers.

a. HIV (human immunodeficiency virus) is a virus that attacks the body's ____________________ system.

b. A person may be infected with the HI virus (HIV+) for ____________________ before the symptoms of AIDS (acquired immunodeficiency syndrome) appear.

c. HIV permits ____________________ to attack the body. These include Kaposi's sarcoma, lymphoma of the brain, certain types of pneumonia, and others. When these conditions occur, a diagnosis of AIDS is made.

d. Because HIV is a mutating virus, researchers currently have been unable to develop a ____________________ for HIV.

e. Those at high-risk for contracting HIV/AIDS include: ____________________

f. The HI virus can live up to ____________________ on a dry surface.

g. 1 ml of contaminated blood contains ________________ HI virus parts.

h. The risk of acquiring HIV from a needlestick injury is less than ________________%.

10. Discuss Universal Precautions for the following areas:

a. Barrier techniques ____

b. Handwashing ____

c. Sharps precautions ____

11. Complete statements concerning the characteristics of radiation by filling in the blanks with the correct answers.

a. Radiant waves and particles are used therapeutically for ________________.

b. Ionizing radiation has the ability to penetrate cells and change them. Because of this effect, exposures should be ________________.

c. Radiation effects are directly related to the amount of exposure and the ________________ of exposure.

d. A possible mild effect of overexposure is ________________.

e. A possible delayed effect from repeated or prolonged exposure is ________________.

f. The universal symbol used to identify radioactive materials, containers, and storage areas is a ________________ on a yellow background.

Written Test

12. Describe at least two radiation safety considerations for both patients and personnel.

    a. Patient safety

        (1) ______________________________

        (2) ______________________________

    b. Personnel safety

        (1) ______________________________

        (2) ______________________________

13. List two flammable anesthetic gases.

    a. ______________________________

    b. ______________________________

14. Match cylinders of compressed gases on the right with their correct standard tank colors.

______a. Orange
______b. Green
______c. Blue
______d. Brown
______e. Black

1. Carbon dioxide
2. Cyclopropane
3. Helium
4. Nitrogen
5. Nitrous oxide
6. Oxygen

Written Test

15. Select from the following list the three most common fire ignition sources in the operating room by placing an "X" next to the correct ignition sources.

______a. Cotton drapes

______b. Synthetic drapes

______c. High intensity light cords

______d. Electrosurgical/Cautery equipment

______e. Oxygen tanks

______f. Lasers

______g. Prep solutions

16. Match types of burns on the right with their correct descriptions.

______a.	Resulting from contact with fire, hot objects, or hot fluids	1. Chemical
______b.	Resulting from overexposure to electricity	2. Electrical
______c.	Resulting from contact with corrosive or irritating substances such as acids or alkalines	3. Radiation
______d.	Resulting from overexposure to radiant energy	4. Thermal

17. Discuss at least two possible causes of patient thermal burns.

____

____

____

____

Written Test

18. Select true statements concerning static electricity by placing a "T" or "F" next to the true or false statements.

_______a. Static electricity is a rare hazard in the O.R.

_______b. Static electricity causes patient shocks and burns.

_______c. Static electricity produces sparks which can ignite fires.

_______d. Static electricity develops from friction and accumulates on physical objects.

_______e. When two static-bearing objects come in contact, the one bearing the higher potential discharges to the one with the lower potential.

_______f. An electrostatic charge or spark between two objects can occur only when there is no pathway of conductivity between them. Therefore, the chief aim is to provide a manner of dissipating the static accumulation.

_______g. A good conductive floor prevents the accumulation of static electricity by providing a pathway of conductivity between all persons and equipment coming in contact with it.

_______h. Oils, waxes, and detergents increase the conductivity of floors and should always be used in the operating room.

19. Complete statements concerning the grounding of electrical equipment by filling in the blanks with the correct answers.

a. All electrical equipment, including ____________________, must be grounded to prevent the leakage of stray current.

b. When an instrument or piece of equipment is properly grounded, leakage current returns to the earth via the ____________________, causing no damage.

c. If the ground path is interrupted by ____________________, leakage current will seek another path to ground, and this alternate path may be through the patient or surgery personnel.

Written Test

20. Match the components of an electrosurgery unit with their correct descriptions.

______a. Machine that produces the power for the "active electrode"

______b. Sterile handpiece that directs the flow of current to the operative site

1. Active electrode
2. Generator
3. Inactive dispersive electrode

21. Distinguish between the types of electrosurgery units by placing an "X" next to the description of a bipolar unit.

______a. The current does not disperse itself through the patient: thus a grounding pad is **NOT** necessary.

______b. An inactive dispersive electrode must be used to "ground" the patient. This is accomplished through the patient grounding pad/plate that is placed in direct contact with the skin.

22. Select true statements concerning safeguards for using electrosurgery units by placing a "T" or "F" next to the true or false statements.

______a. Place dispersive electrodes on skin over metal implants.

______b. Dispersive electrodes must be clean, free from bent edges, and adhere uniformly to the skin.

______c. Connection between generator and dispersive electrode must be secure.

______d. Dispersive electrode should cover a very small surface area.

______e. Place dispersive electrode as close to operative site as possible.

______f. Metal connection between pad or plate and conductor cord must not touch the patient.

Written Test

23. Discuss at least five personnel safeguards and five environmental safeguards for preventing electrical and fire hazards.

    a. Personnel safeguards

    (1) ____________________

    (2) ____________________

    (3) ____________________

    (4) ____________________

    (5) ____________________

    b. Environmental safeguards

    (1) ____________________

    (2) ____________________

    (3) ____________________

    (4) ____________________

    (5) ____________________

24. Discuss at least two precautions for using lasers in the following areas:

    a. Patient safety precautions

    (1) ____________________

    (2) ____________________

    b. Personnel safety precautions

    (1) ____________________

    (2) ____________________

Written Test

c. Environmental safety precautions

(1) ____

(2) ____

*Permission to duplicate this test is granted.

Workplace Safety
Unit 2-C

Unit Evaluation Form

Student Name ________________________ Unit Rating ________

Assignment Sheet 1—Locate Information About Chemicals Using an MSDS Rating ______

Comments: ____

____

Assignment Sheet 2—Apply Universal Precautions to the Workplace Rating ______

Comments: ____

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

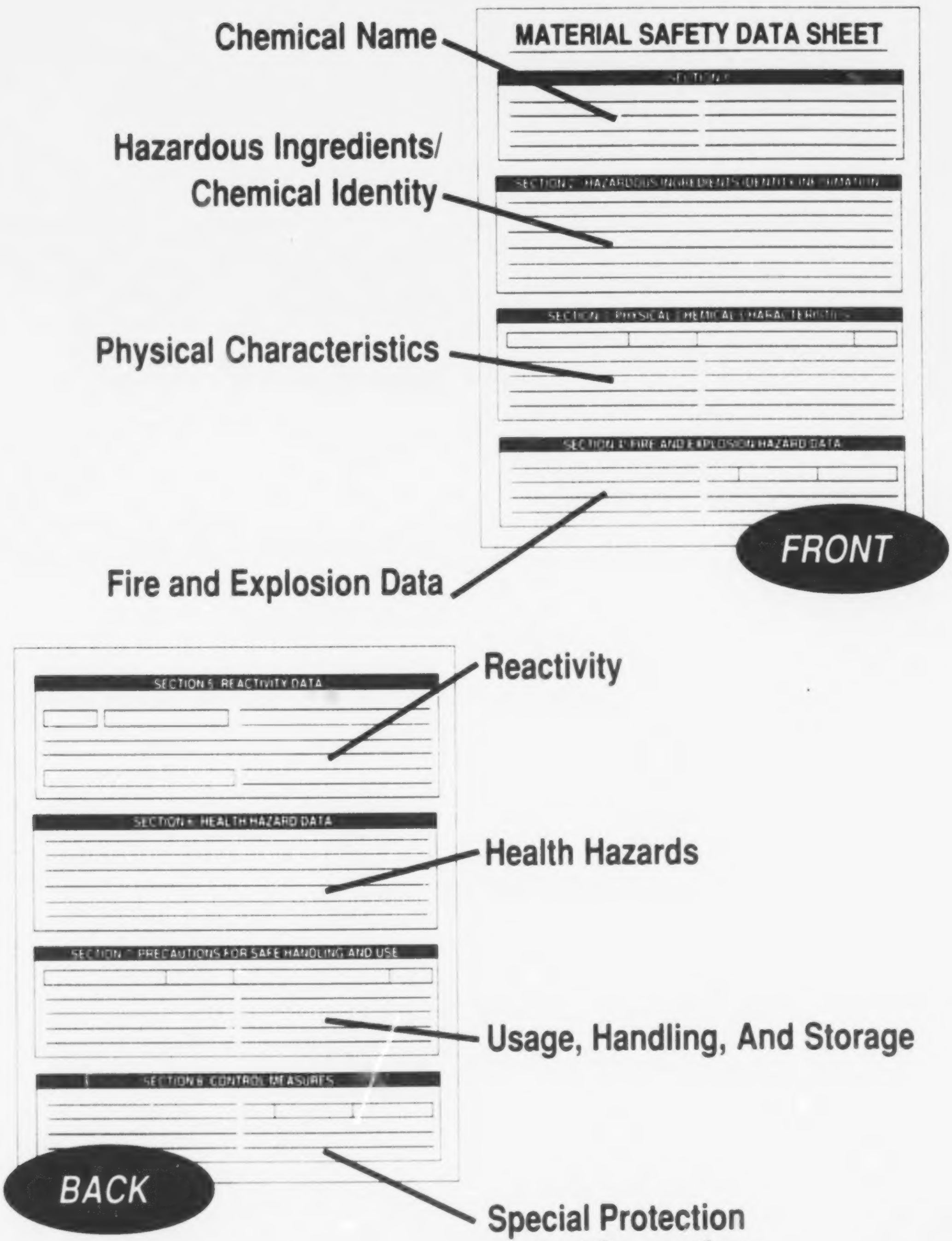
____

Teacher Signature ________________________ Date ________

Student Signature ________________________ Date ________

***Permission to duplicate this form is granted.**

MSDS Example


MATERIAL SAFETY DATA SHEET
SECTION 1
SECTION 2 HAZARDOUS INGREDIENTS/IDENTITY INFORMATION
SECTION 3 PHYSICAL/CHEMICAL CHARACTERISTICS
SECTION 4 FIRE AND EXPLOSION HAZARD DATA
FRONT
SECTION 5 REACTIVITY DATA
SECTION 6 HEALTH HAZARD DATA
SECTION 7 PRECAUTIONS FOR SAFE HANDLING AND USE
SECTION 8 CONTROL MEASURES
BACK

Chemical Name

Hazardous Ingredients/ Chemical Identity

Physical Characteristics

Fire and Explosion Data

Reactivity

Health Hazards

Usage, Handling, And Storage

Special Protection And Precautions

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Workplace Safety
Unit 2-C

Information Sheet

1. **Terms and definitions**

   a. **Centers for Disease Control (CDC)** — Division of the U.S. Public Health Service for investigation and control of various diseases, especially those that have epidemic potential

   b. **Electrocautery** — Using a high frequency electric current to cut or coagulate tissue

   c. **Electrosurgery** — Surgical procedures in which electricity is required either in the actual surgical apparatus or in the application of electrocautery

   d. **Exposure** — Amount of radiation being delivered or received over a given area or to the entire body

   e. **Fluoroscope** — Fluorescent light reproducing optical images of body structures onto a screen

   f. **Hazardous material** — Any dangerous substance that has the potential for damaging effects on specific body organs

   g. **Infectious disease** — Any disease caused by growth of pathogenic microorganisms in the body

   h. **Laser** (Light Amplification by Stimulated Emission of Radiation) — Device that uses the natural oscillations of atoms or molecules between energy levels for generating coherent electromagnetic radiation in the ultraviolet, visible, or infrared regions of the light spectrum

      Note: This high energy beam of light is currently being used for cutting.

   i. **Material safety data sheet** (MSDS) — Form that lists and explains hazardous materials that an employee works with so the employee can safely use the material and respond to emergency situations

   j. **Occupational Safety and Health Act** (OSHA) — Federal legislation designed to ensure safe and healthful working conditions for employees

   k. **Regulated waste** — Blood or other blood products that are potentially infectious materials

Information Sheet

l. **Scatter radiation** — X-rays that have changed direction because of a collision with an object

Note: These bouncing rays can expose bystanders.

m. **Shield** — Protective barrier of lead to stop radiant energy

n. **Universal Precautions** — Guidelines recommended by the CDC to prevent the transmission of bloodborne pathogens

Note: All health care workers must follow these universal precautions because every patient's blood, tissue, and body fluids are potentially infectious.

o. **X-rays** — High-energy electromagnetic waves capable of affecting photographic plates

2. **Types of hazardous materials found in the healthcare workplace**

a. Body fluids containing infectious materials

Examples: Blood, urine, drainage from wounds

b. Sharp instruments or supplies

Examples: Scalpel blades, needles

c. Flammable gases

Examples: Oxygen, nitrous oxide

d. Radiation/radioactive substances

Examples: Radium implants, x-rays

e. Electrical equipment

Examples: Electrosurgical units, hyper/hypothermia units

f. Chemicals

Examples: Ethylene oxide, formaldehyde, Betadine®

Information Sheet

3. **OSHA regulations required of employers**

   a. To provide written policies and training for the safe use, handling, dispensing, and storing of hazardous materials

   b. To follow CDC guidelines on infection control

   c. To provide protection from high noise levels

   d. To provide adequate ventilation systems

   e. To minimize radiation exposure

   f. To meet standards for fire and electrical safety

   g. To provide training in laser safety

4. **Hazard communication (HazCom)**

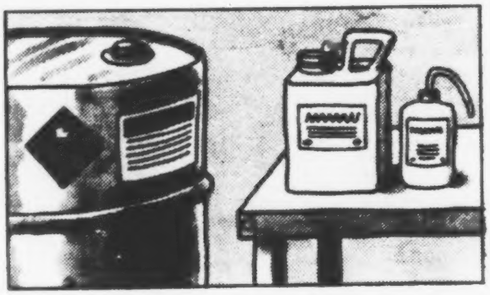
   a. OSHA established the HazCom Standard to protect the health and safety of employees.

   b. The HazCom Standard ensures your "right to know" about potentially dangerous chemicals in the workplace.

   c. OSHA requires employers to develop a written HazCom program including:

      (1) Warning labels on containers

Figure 1



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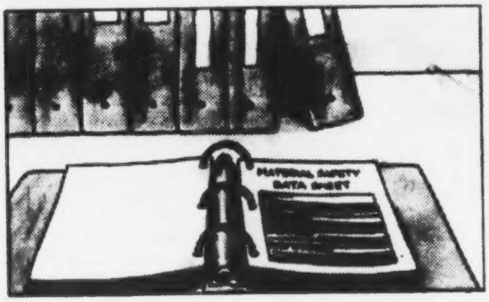
Information Sheet

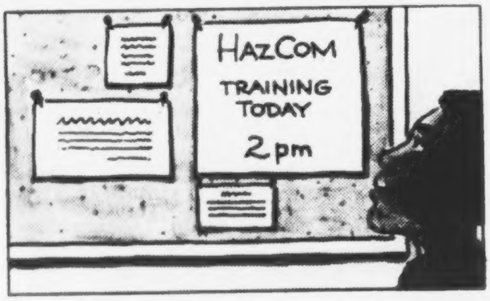
(2) Material Safety Data Sheets (MSDS) readily available to employees

Figure 2


MATERIAL SAFETY
DATA SHEET

(3) Employee training on the proper handling, usage, storage, and transportation of chemicals

Figure 3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5. **Information on a chemical label**

   a. Chemical name and ingredients

   b. Name, address, and phone number of the manufacturer or distributor

   c. Procedures for usage, handling, storage, and disposal

   d. How to handle spills and leaks

Information Sheet

e. Signal words identifying chemical as hazardous

  (1) Caution—Least severe

  (2) Warning—Very severe

  (3) Danger—Most severe

f. Critical first aid instructions and type of fire extinguisher to use

g. Personal protective equipment to wear when using the chemical

h. Other information about the chemical

  (1) Flammability

  (2) Radioactivity

  (3) Reactivity—Uses words "incompatible," "instable," and "volatile"

  (4) Toxicity

  Note: Never use a chemical without reading its label. If the label is missing, immediately notify your instructor/supervisor.

6. **Information on a material safety data sheet (MSDS)**

Note: Each company can design its own MSDS form, and the sections may be in a different order than the following list. However, they must include all of the following information.

a. **Chemical name** — Lists the identity of the substance, the date the MSDS was prepared, name and address of the manufacturer, and usually a phone number for emergencies

b. **Hazardous ingredients/chemical identity** — Includes names of substances in the chemical that might be dangerous, safe exposure limits, and common names for the chemical

c. **Physical characteristics** — Describes usual or safe physical qualities such as how it looks or smells, boiling and melting temperatures, evaporation rates, how easily it dissolves, and how heavy it is (compared to water)

d. **Fire and explosion data** — Identifies flash point, flammability, combustibility, and the best way to put out a fire involving that chemical

Information Sheet

e. **Reactivity** — Describes what happens if this chemical comes in contact with certain conditions (like heat) or chemicals (like air, water, others).

f. **Health hazards** — Lists ways the chemical might enter your body, symptoms of overexposure, and emergency first aid procedures

g. **Usage, handling, and storage** — Describes how to clean up an accidental spill, leak, or release, including special precautions. Tells how to handle, store, and dispose of chemical safely.

h. **Special protection and precautions** — Explains special personal protective equipment and other equipment to use when working with the chemical and extra health and safety information not covered in other sections

7. **Bloodborne pathogens**

a. Bloodborne pathogens are microorganisms in the bloodstream that can cause disease.

b. These are the greatest health concern today because the pathogens can be deadly.

c. They include malaria; syphilis; hepatitis B, C, and D; and the human immunodeficiency virus (HIV).

d. Bloodborne pathogens are found in contaminated blood, body fluids including semen, vaginal secretions, breast milk, and cerebrospinal fluid, as well as tissue cultures.

Note: Although these microorganisms are found in all body fluids, in many cases they are not strong enough to be transmitted.

e. In order for an infection to take place, both the source blood must be infected, and that blood must enter into your bloodstream through the following routes:

(1) Unprotected opening in the skin such as cuts, scrapes, and dermatitis

(2) Unprotected mucus membrane openings such as the eyes, nose, and mouth

(3) Penetration into the skin by a sharp object such as broken glass, a needle, or knife blade

f. Extra precautionary measures known as "Universal Precautions" must be followed to prevent infection from bloodborne pathogens. Since you cannot tell by looking if the source blood is contaminated, all blood and body fluids must be treated as potentially infectious.

Information Sheet

8. Characteristics of hepatitis

a. Hepatitis is an inflammation of the liver.

b. The swelling and redness can be caused by toxins or drugs, but is most often caused by a virus.

c. There are five types of hepatitis viruses (A-E).

(1) Hepatitis A (HAV) is primarily transmitted by fecal/oral direct contact or contaminated water or food.

(2) Hepatitis B (HBV) is transmitted through blood or body fluids, through sexual contact, or contaminated needles.

(3) Hepatitis C (HCV) is parenterally transmitted by blood transfusions, parenteral drug use, or hemodialysis.

(4) Hepatitis D (HDV) causes infection only in the presence of active HBV infection through the same transmission methods of HBV.

(5) Hepatitis E (HEV) is transmitted by fecal/oral direct contact, primarily in developing countries.

d. Hepatitis B (HBV) is the major infectious bloodborne hazard faced on-the-job by healthcare workers.

(1) An estimated 300,000 people in the United States are infected with hepatitis B virus annually; more than 10,000 require hospitalization and an average of 250 die.

(2) 1 ml of contaminated blood contains 1 billion hepatitis B virus parts.

(3) Hepatitis B virus lives up to 7 days on dry surfaces.

(4) Healthcare workers are at a 3 to 5 times greater risk of contracting HBV than the normal public.

(5) The risk of acquiring hepatitis B from a needlestick injury with hepatitis B contaminated blood is 6% to 30%.

Information Sheet

(6) Those at high-risk for contracting hepatitis B include:

- Healthcare personnel
- Police, fire, and emergency medical personnel
- Funeral home personnel
- Janitorial and housekeeping personnel
- Patients requiring frequent or large-volume blood or blood transfusions
- Patients on hemodialysis
- Household members of those in contact with hepatitis B
- Sexual partners of hepatitis B patients/carriers
- Injectable-drug users

(7) All healthcare workers should follow "Universal Precautions" and receive the hepatitis B vaccine (pre-exposure or post-exposure) and the hepatitis B immune globulin (HBIG) (temporary passive protection, post-exposure).

9. Characteristics of HIV and AIDS

a. HIV (human immunodeficiency virus) is a virus that attacks the body's immune system.

b. A person may be infected with the HI virus (HIV+) for years before the symptoms of AIDS (acquired immunodeficiency syndrome) appear.

c. HIV permits opportunistic infections, malignancies, and neurologic diseases to attack the body. These include Kaposi's sarcoma, lymphoma of the brain, certain types of pneumonia, and others. When these conditions occur, a diagnosis of AIDS is made.

d. Because HIV is a mutating virus, researchers currently have been unable to develop a cure or vaccination for HIV.

e. Experts predict that by the end of 1993, there will have been a cumulative total of 300,000 AIDS cases in the U.S., including 233,000 deaths. AIDS is the leading cause of death under 40 years of age.

f. Those at high-risk for contracting HIV/AIDs include:

- Former patients who received blood or blood products contaminated with HIV (all blood is now screened)
- Sexual partners of HIV+ or AIDS patients
- Injectable-drug users

Information Sheet

g. HIV/AIDS is a serious concern for healthcare workers because it is a deadly virus.

(1) The HI virus can live up to 24 hours on a dry surface.

(2) 1 ml of contaminated blood contains 1000 HI virus parts.

(3) The risk of acquiring HIV from a needlestick injury is less than 1%.

Note: Although HIV is less contagious than hepatitis B, it is more lethal.

Table 1: Comparison of HIV and HBV

	HIV	HBV
TRANSMISSION	Sexual contact Parenteral Perinatal	Parenteral Sexual contact Perinatal
INCUBATION	5-6 days to get through blood stream 2 weeks to 2 months to show positive test Up to 10+ years asymptomatic	40-180 days
SYMPTOMS	HIV+ (asymptomatic) ARC Flu symptoms AIDS opportunistic diseases	1/3 asymptomatic Flu symptoms ACUTE jaundice
PROGNOSIS	DEATH	Complete recovery - 6 months Chronic carrier Complications such as: Cirrhosis Liver cancer Chronic liver disease DEATH

Information Sheet

10. Universal Precautions

a. **Barrier techniques** — Wear barrier protective equipment to prevent skin and mucous membrane contact with blood and body fluids.

   (1) Gloves

   (2) Masks

   (3) Eyewear and face shields

   (4) Gowns or aprons (impermeable)

b. **Handwashing** — Wash hands thoroughly following every contact with blood, a patient, and items in contact with blood and body fluids. Wash hands after removing gloves.

c. **Sharps precautions** — All cutting instruments and needles present a potential hazard for the user as well as the handler.

   (1) Use instruments to attach a knife blade.

   (2) Keep needles on needleholders.

   (3) DO NOT RECAP NEEDLES.

   Note: If re-capping needles is required by a specific medical procedure, DO NOT use a two-handed manual technique.

   (4) Place sharps in an easily accessible, closable, puncture-resistant container.

d. **Oral procedures** — Resuscitation bags and other ventilation devices should be available for emergency mouth-to-mouth resuscitation to prevent direct contact.

e. **Care of specimens** — Blood and body fluids from all patients are considered infectious. All specimens should be contained.

f. **Decontamination** — All furniture surfaces, equipment, and instruments should be thoroughly cleaned before sterilization.

g. **Laundry** — Soiled linen and drapes should be handled as little as possible to prevent possible airborne contamination and spillage from linen.

Information Sheet

h. **Waste**

(1) Place potentially infective waste in puncture-proof bags and dispose of them according to the hospital's guidelines.

(2) Trash is disposed of by incineration or sent to a sanitary landfill.

(3) Body fluids and blood may be poured down a drain connected to a sanitary sewer.

11. Characteristics of radiation

a. Radiant waves and particles are used therapeutically for diagnosis (x-rays) and treatment of cancer (radioisotopes and other radioactive sources).

b. Ionizing radiation has the ability to penetrate cells and change them. Because of this effect, exposures should be limited.

c. Radiation effects are directly related to the amount of exposure and the length of time of exposure.

d. Radiation effects may be delayed without evidence for years.

e. Overexposure to radiation can result in illnesses ranging from mild to deadly.

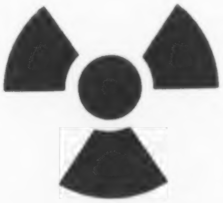
(1) Mild effects—Anorexia, headache, nausea, vomiting, and diarrhea

(2) Delayed effects from repeated or prolonged exposure—Amenorrhea, sterility, disturbances in blood cell formation, cataracts, carcinogenesis, and leukemia

(3) Serious effects from massive radiation (accident or atomic bomb)—Tissue necrosis, extensive hemorrhages, bone marrow injury, loss of hair and teeth, genetic changes, and death

f. The universal symbol used to identify radioactive materials, containers, and storage areas is a purple propeller on a yellow background.

Figure 4



Information Sheet

12. Radiation safety considerations

a. Patient safety

   (1) Shield body areas from scatter radiation.

   (2) Take an X-ray for lost sponge or needle only after a thorough search has been made to eliminate radiation exposure.

   (3) Turn off fluoroscope and other equipment when not in use.

   (4) Use lead shields to protect the fetus of a pregnant patient.

b. Personnel safety

   (1) Rotate assignments on procedures that involve radiation when possible.

   (2) Turn off machines when not in use.

   (3) Leave radioactive elements in lead-lined containers until ready to use.

   (4) Use protective shields and equipment when necessary.

   (5) Use a monitoring device to measure accumulated exposure to radiation.

13. Flammable anesthetic gases

Note: Most operating rooms today have abandoned the use of flammable anesthetic gases. However, a few hospitals may still use these flammable agents.

a. Cyclopropane

b. Divinyl ether

c. Ethyl ether

d. Ethyl chloride

e. Ethylene

Information Sheet

14. Cylinders of compressed gas and their standard tank colors

Note: All O.R. personnel should know these tank colors.

a. Oxygen — Green

b. Nitrous oxide — Blue

c. Carbon dioxide — Gray

d. Nitrogen — Black

e. Helium — Brown

f. Cyclopropane — Orange

15. Common fire ignition sources in the operating room

a. High intensity light cords

Note: The temperature at the end of a high intensity fiberoptic light cord is well above the ignition temperature of most surgical drapes.

b. Electrosurgical/cautery equipment

Note: The temperature at the tip of the electrode is several hundred degrees, enough for cauterizing tissue. However, when the tip is unprotected and the switch is accidentally activated, it can also ignite drapes, gowns, hair, endotracheal tubes, or anything else it contacts.

c. Lasers

Note: Accidental activation of the laser beam has resulted in several airway fires from the ignition of the endotracheal tube. Drapes have also been ignited.

16. Types of burns

a. **Thermal** — Resulting from contact with fire, hot objects, or hot fluids

Examples: Saline, warming blankets, lasers

b. **Electrical** — Resulting from overexposure to electricity

Example: Electrosurgical/cautery unit

Information Sheet

c. **Chemical** — Resulting from contact with corrosive or irritating chemicals such as acids or alkalines

Examples: Ethylene oxide gas, Cidex®, iodine

d. **Radiation** — Resulting from overexposure to radiant energy

Examples: Radium, x-rays, nuclear explosions, sunlight

Note: Most burns received by a patient while in the hospital are due to inadequately trained or irresponsible personnel or malfunctioning or inadequately grounded electrical equipment.

17. **Possible causes of patient thermal burns**

a. Malfunctioning, heat-generating devices in contact with the patient

Examples: Hypo-hyperthermia machine, radio-frequency diathermy unit, lasers

b. Pooling of prep solution under the patient when using electrocautery

c. Using alcohol sponges when using electrocautery

d. Using phenol as a marking agent or a prep solution

e. Using hyperthermia unit with mattress above 140°F

f. Physical fire

18. **Static electricity**

a. Static electricity is a common hazard in the O.R.

b. Static electricity does not cause patient shock or burns.

c. However, it does produce sparks which can ignite fires.

d. Static electricity develops from friction and accumulates on physical objects.

e. When two static-bearing objects come in contact, the one bearing the higher potential discharges to the one with the lower potential.

f. An electrostatic charge or spark between two objects can occur only when there is no pathway of conductivity between them. Therefore, the chief aim is to provide a manner of dissipating the static accumulation.

Information Sheet

g. A good conductive floor prevents the accumulation of static electricity by providing a pathway of conductivity between all persons and equipment coming in contact with it.

h. Safe furniture is made of electrically-conductive materials or contact to the floor is made through electrically-conductive leg tips, casters, or wheels.

i. Electrically-conductive materials must be kept clean and free of debris such as dirt, dust, wax, blood, glass, or suture in order to retain their full conductivity.

j. Oils, waxes, and detergents reduce the conductivity of floors and should not be used in the operating room.

k. Operating room floors are cleaned with materials that do not reduce conductivity such as iodophor or phenolic detergent-disinfectants.

19. Grounding of electrical equipment

a. All electrical equipment, including heart monitors, defibrillators, x-ray machines, electrosurgical units, and electrical saws and drills, must be grounded to prevent the leakage of stray current.

b. When an instrument or piece of equipment is properly grounded, leakage current returns to the earth, via the ground wire, causing no damage.

c. If the ground path is interrupted by broken or frayed cords or plugs or defective equipment, leakage current will seek another path to ground, and this alternate path may be through the patient or surgery personnel.

20. Components of an electrosurgery unit

a. **Generator** — Machine that produces the power for the "active electrode" to coagulate or cut tissue

b. **Active electrode** — Sterile handpiece that directs the flow of current to the operative site

c. **Inactive dispersive electrode** — Disperses the current released through the active electrode and provides a return from the tissues back to the generator

Information Sheet

21. **Types of electrosurgery units**

    a. **Bipolar unit**

       (1) Allows the current to flow only between the tips of the active electrode and then returns to the generator.

       (2) The current does not disperse itself through the patient; thus a grounding pad is NOT necessary.

    b. **Monopolar unit**

       (1) The current flows from generator to active electrode, through the patient, to an inactive dispersive electrode, and then back to the generator.

       (2) Because, the current supplied by the generator is dispersed from the active electrode, it seeks completion of electrical circuit to ground or neutralization through the patient's body tissues.

       (3) An inactive dispersive electrode must be used to "ground" the patient. This is accomplished through the patient grounding pad/plate that is placed in direct contact with the skin.

       (4) The dispersive grounding pad/plate must be properly placed and connected to avoid electrical burns to the patient.

22. **Safeguards for using electrosurgery units**

    a. Place dispersive electrode:

       (1) As close as possible to operative site

       (2) To cover as large of surface area as possible

       (3) On a clean, hair-free, scar-free area

    b. Do not place dispersive electrode on skin over a metal implant.

    c. Dispersive electrode must be clean, free from bent edges, and adhere uniformly to the skin.

    d. Connection between dispersive electrode and generator must be secure.

    e. Metal connection between pad or plate and conductor cord must not touch the patient.

    f. Electrical burn through the patient's skin is the greatest hazard of electrosurgery.

Information Sheet

g. Flammable anesthetics should not be used with electrosurgery.

h. Electrosurgery should not be used in the mouth, around the head, or in pleural cavity when high concentrations of oxygen or nitrous oxide are used.

i. ECG electrodes should be placed as far away from the operative site as possible to avoid diversion to an alternate ground site.

j. Connection of a bipolar active electrode to a monopolar receptacle may activate current causing a short circuit.

k. Moist sponges should be used to prevent fire.

l. Investigate a repeated request to increase the "power" or "current". The dispersive electrode or connecting cord may be detached.

m. Follow all manufacturers' guidelines on operation and use of unit.

n. Keep the electric cautery tip in a holster when it is not being used.

o. Electrosurgery causes more patient injuries than any other electrical device used in the operating room.

p. Most incidents involving electrosurgical units are due to personnel error.

23. Safeguards for preventing electrical and fire hazards

a. Personnel safeguards

(1) Wear proper operating room attire and conductive shoe covers.

(2) Cover all hair to prevent electrostatic sparks.

(3) Never use open flames in the operating room.

(4) Never move a patient from one area to another while a flammable anesthetic is being administered.

(5) Properly ground a patient before using electrosurgical unit.

(6) Always check electrical cords and wires for fraying and breakage before using.

(7) Never use a piece of electrical equipment without having been taught the proper method of usage.

(8) If equipment appears damaged or malfunctioning, immediately discontinue its use and send for repair.

Information Sheet

(9) Avoid unnecessary motion around the patient's head and the anesthesia machine.

Note: The most explosive area in the O.R. is the area in a two-foot radius around the patient's face mask.

(10) Turn off all electrical equipment when it is no longer needed.

b. Environmental safeguards

(1) Air conditioning with controlled humidity should be used in all operating rooms to reduce explosion hazards, provide comfort for the patient and personnel, and help control airborne bacteria.

(2) The range of temperature used varies from 60°F-80°F with the average around 70°F.

(3) Humidity should be 55-60%. This atmosphere minimizes static electricity build-up in the presence of flammable anesthetic agents.

Note: The minimum relative humidity used is 50%.

(4) Air conditioning must function properly and air intakes and exhausts must be installed in designated places to provide proper ventilation and filtration. The farther apart, the better. This aids in the prevention of pockets of gas in the room.

(5) Positive static pressure, which is the greater air pressure in the operating room in relation to the lesser pressure outdoors, is used in the O.R. to provide a one-way directional laminar air flow for the prevention of the outside intake of airborne microorganisms and the accumulation of static electricity.

Note: Laminar air flow reduces the number of organisms to 0-1 per cubic foot and provides an almost microbial-free air environment so necessary in high-risk procedures.

(6) Operating room doors should be kept closed in order to maintain a positive static pressure.

(7) O.R. furniture should be made of metal or conductive rubber.

(8) Only cotton blankets and sheets should be used in the operating room because wool, silk, nylon, and synthetic materials have static potential.

Information Sheet

(9) All electrical receptacles (outlets and switches) must be 5′ above the floor or be explosion-proof.

(10) Anesthesia machines, cylinders of compressed gas, and flammable liquid containers must be kept away from sources of heat and must not touch each other.

Note: Cylinders of compressed gas must also be anchored down with a chain or in a rack to prevent mishaps.

24. Precautions for using lasers

a. Patient safety precautions

(1) Noncombustible anesthetic agents should be used.

(2) Endotracheal tubes should be properly protected (insulated or wrapped with reflective aluminum or copper tape)

(3) Patient's eyes should be protected.

(4) Nonflammable antiseptic should be used for skin preparation.

(5) Skin surrounding incision and/or target tissue should be protected from possible thermal burn.

(6) Postoperative instructions should include care of healing thermal wound if on the skin.

b. Personnel safety precautions

(1) Wear proper eye protection.

(2) Protect skin.

(3) Avoid inhalation of laser plume.

c. Environmental safety precautions

(1) Warning signs should be posted on all doors.

(2) Walls and ceilings should have non-reflective surfaces.

(3) Warning labels must indicate points of danger to avoid personnel exposure to laser radiation.

Information Sheet

(4) Check machine for proper functioning. Any malfunction should prohibit use until repaired.

(5) Machine should be kept on "standby" setting when not in use during the surgical procedure.

(6) Monitor the laser foot switch.

(7) Use nonreflective instruments.

(8) A basin of sterile water should be available in case of fire.

(9) Electrical codes must be enforced.

(10) Follow manufacturers' instructions for operation, care, handling, and sterilization procedures.

Workplace Safety
Unit 2-C

Assignment Sheet 1—Locate Information About Chemicals Using an MSDS

Name ______________________ Overall Rating __________

Evaluation criteria	**Rating**
Student correctly located MSDS book	______
Answers are correct	______
Answers are complete	______

Directions: Provide information on the following chemicals using your MSDS (material safety data sheets).

1. ALCOHOL

    a. Physical characteristics:

    ____

    ____

    ____

    b. Flash point:

    ____

    c. Combustible:

    ____

    ____

    d. Flammable:

    ____

    ____

Assignment Sheet 1

e. Health hazards:

f. Usage, handling, and storage:

g. Special personal protective equipment needed:

2. HEXACHLOROPHENE

a. Common name:

b. Physical characteristics:

c. Reactivity:

Assignment Sheet 1

d. Health hazards:

e. Storage requirements:

f. Flammable:

g. Special protection and precautions:

3. POVIDONE-IODINE

a. Common name:

b. Physical characteristics:

Assignment Sheet 1

c. Combustible:

d. Reactivity:

e. Health hazards:

f. Storage, usage, and handling

g. Special protection and precautions

Workplace Safety
Unit 2-C

Assignment Sheet 2—Apply Universal Precautions to the Workplace

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Answers are correct	______
Descriptions are complete with correct grammar, spelling, and punctuation	______

Directions: Read each of the following situations, and select the best answer or state your answer in a complete sentence.

Multiple Choice

______ 1. Occupational exposure to bloodborne pathogens may include:

a. Getting body fluids on non-intact skin
b. Being bitten by someone
c. Getting stuck with a used needle
d. All of the above

______ 2. How long can the hepatitis B virus live on a cabinet surface or sheet?

a. One hour
b. One day
c. One week
d. One month

______ 3. An employee is responsible for

a. Following safety guidelines
b. Reporting an exposure
c. Both of the above
d. Neither of the above

______ 4. If contamination of hands is likely, you should:

a. Wear a gown
b. Wear gloves
c. Wear goggles
d. All of the above

Assignment Sheet 2

_____ 5. In surgery you should:

- a. Wear a gown
- b. Wear gloves
- c. Wear goggles
- d. All of the above

True or False

_____ 6. The two most common bloodborne diseases in the workplace are hepatitis A and HIV.

_____ 7. HIV is more contagious than hepatitis B.

_____ 8. HIV is more lethal than hepatitis B.

_____ 9. If you are allergic to gloves, it is best not to wear them.

_____ 10. An employee with an unprotected cut on her hand reaches into a trash can to compress the contents. When she pulls her hand out, it is blood stained. She could now be infected with a bloodborne pathogen.

Fill in the Blanks

11. You should treat all blood and body fluids as ____________________.

12. After removing your gloves, you should ____________________.

13. Dispose of sharps by ____________________.

14. ____________________ should be used for emergency mouth-to-mouth resuscitation.

15. The risk of acquiring hepatitis B from a needlestick injury is ____________________%.

16. The HI virus can live for ____________________ (hours, days, weeks, months) on a dry surface.

Assignment Sheet 2

Essay Answer

17. Of HIV and hepatitis B, which do you think poses a more serious threat to you as a surgical technologist. Explain.

18. How are HIV and hepatitis B transmitted? Describe.

19. What can you do to prevent the transmission of bloodborne pathogens, both in your personal life and your professional life. Explain.

Assignment Sheet 2

20. Why do you think the federal government is involved in establishing guidelines about bloodborne pathogens?

____

____

____

____

____

____

Introduction to Microbiology
Unit 1-D

Objective Sheet

Unit Objective

After completing this unit, the student should be able to distinguish between various microorganisms and their diseases. The student should demonstrate these competencies by completing the assignment sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to microbiology with their correct definitions.
2. Select major classes of microorganisms.
3. Match microbial relationships with the correct descriptions.
4. Select true statements concerning characteristics of protozoa.
5. Match protozoan diseases with the correct causes and characteristics.
6. Select true statements concerning characteristics of fungi.
7. Distinguish between characteristics of yeasts and molds and their mycoses.
8. Select true statements concerning characteristics of bacteria.
9. Match types of bacteria with the correct descriptions of their shapes.
10. Match specialized structures of bacteria with the correct descriptions.
11. Distinguish between types of toxins produced by bacteria.
12. Select true statements concerning growth requirements of bacteria.
13. Match pathogenic bacteria with the correct diseases they cause.
14. Complete statements concerning characteristics of rickettsiae and the diseases they cause.
15. Select true statements concerning characteristics of helminths.

Objective Sheet

16. Complete statements concerning characteristics of viruses.

17. List viral diseases according to type.

18. Select true statements regarding the types of hepatitis.

19. Complete statements concerning the characteristics of AIDS.

20. Research the causes and prevention of a human disease. (Assignment Sheet 1)

Introduction to Microbiology
Unit 1-D

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Relationships of Microorganisms (Objective 3)
   TM 2—Protozoa (Objective 4)
   TM 3—Fungi (Objective 7)
   TM 4—Bacteria (Objective 9)
   TM 5—Specialized Structures of Bacteria (Objective 10)
   TM 6—Rickettsiae and Viruses (Objectives 14 and 16)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheet. Review criteria for evaluation of this activity.

12. Discuss the student supplements. These could be used as homework assignments, daily practice exercises, or quizzes. Explain to students how you plan to evaluate the supplements, if at all.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Compile assignment sheet rating and written test scores on the Unit Evaluation Form. Include any additional assignments.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Show videos on the various types of microorganisms. Several are listed in the "Suggested Supplemental Resources" that follow. Videos can reinforce **communication skills** and help to make the information more interesting.

2. Either have a guest speaker talk to the class or arrange a field trip to a local medical laboratory or pathology department so students will have a better understanding of the work of microbiologists, bacteriologists, and medical lab technicians.

    a. Have these resource people demonstrate activities they use to study microorganisms, such as preparing slides, Gram staining, and culturing. Also have them discuss safety precautions they must follow when working with microorganisms.

    b. Have them demonstrate the proper use of a microscope, and then have students examine prepared Gram-negative and Gram-positive slides.

    These activities with resource people can reinforce **communication, adaptability, personal management**, and **group effectiveness skills**.

3. Discuss the relationship between microbiology and aseptic technique used in surgery and other areas of health care. **Communication and adaptability skills**.

Suggested Activities

4. Discuss the types of pathogens that can cause nosocomial infections. Refer to Teacher Supplement 1 for a partial listing. By showing the relevance between this unit and the students' future jobs, you can increase their **motivation** to learn, as well as their **communication skills**.

5. Use the student supplements included with this unit to reinforce this basic information and terminology. These can be used by groups or individuals. You can also use them with the entire class or teams as a review game. They can reinforce **foundation (reading and writing), problem solving**, and **group effectiveness skills**.

6. You may wish to assign the research topics in Assignment Sheet 1 so that all are covered, or so the more common diseases are examined. Let students know whether you want written or oral reports. After the reports are completed, have students discuss which diseases are of the most concern to them as surgical technologists. This additional activity can reinforce **communication, adaptability, personal management**, and **group effectiveness skills**.

Resources Used in Developing This Unit

1. Atkinson, Lucy Jo. *Berry and Kohn's Operating Room Technique*, 7th ed. St. Louis: C. V. Mosby Year Book, 1992.

2. Burton, Gwendolyn R. W. *Microbiology for the Health Sciences*, 4th ed. Philadelphia: J. B. Lippincott Company, 1992.

3. Dock, Nancy L. "The ABC's of Viral Hepatitis," *Clinical Microbiology Newsletter*, Vol. 13, No. 3. pp 17-20. Feb. 1, 1991.

4. Meeker, Margaret H. and Jane C. Rothrock. *Alexander's Care of The Patient In Surgery*, 9th ed. St. Louis: C. V. Mosby Year Book, 1991.

5. Warden-Tamparo, Carol and Marcia Lewis. *Diseases of the Human Body*. Philadelphia: F. A. Davis, 1989.

Suggested Supplemental Resources

1. *Clinical Microbiology Newsletter (ISBN 0196-4399)*. Published twice monthly. Elsevier Science Publishing Co., 655 Avenue Of the Americas, New York, NY 10010.

2. American Liver Foundation for free information about hepatitis. Cedar Grove, NJ 07009. 210-256-2550.

3. *The Body Against Disease*, 1980, 45 minute videotape.

Suggested Activities

4. *Viruses: The Mysterious Enemy*, 1982, 30 minute videotape.

5. *Bacteria: Invisible Friends and Foes*, 1983, 45 minute videotape.

   3-5 are available from:

   Human Relations Media
   175 Tompkins Avenue
   Pleasantville, NY 10570
   800-431-2050 or 914-769-6900

6. *Bacteria and Viruses*, 20 minute videotape explaining the differences between these microorganisms.

7. *The Common Cold*, 28 minute videotape discussing research on how the cold virus replicates and spreads. This information may be useful for also preventing other viruses such as meningitis, hepatitis, and polio.

   6 and 7 are available from:

   Films for the Humanities and Sciences
   P.O. Box 2053
   Princeton, NJ 08543-2053
   800-257-5126 or 609-452-1128

8. *Bacteria*, 1988, 19 minute videotape illustrating bacteria's basic shapes, reproduction, life cycles, and techniques for studying bacteria.

9. *Cancer: The Genetic Connection*, 1985, 30 minute videotape showing the difference between cancer cells and normal cells. Also explains how the presence of oncogenes can cause a mutation in genetic programming and thus change the regulatory mechanisms of cell growth. The body's natural defense mechanisms (T-cells and macrophages) are described, as are external methods of controlling cancer.

   8 and 9 are available from:

   Insight Media
   121 West 85th Street
   New York, NY 10024
   800-233-0034 or 212-721-6316

Suggested Activities

10. *The Biology of Bacteria*

11. *The Biology of Viruses*

12. *The Biology of Fungi*

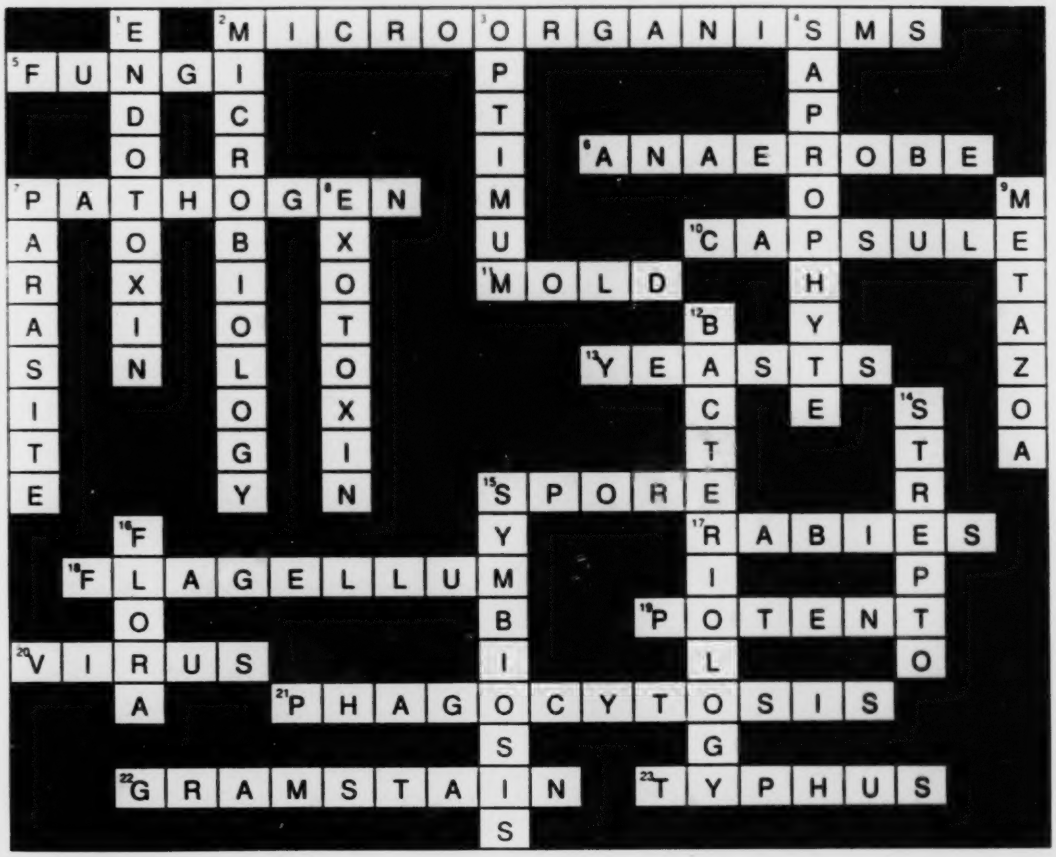
10-12 are live-action videos (16 min. each) that are part of the *MicroLife Series* available from:

Projected Learning Programs Inc.
P.O. Box 3008
Paradise, CA 95967-3008
800-248-0757 or 916-877-0603

Introduction of Microbiology
Unit 1-D

Answers to Student Supplements

Student Supplement 1


2 MICROORGANISMS
5 FUNGI
6 ANAEROBE
7 PATHOGEN
10 CAPSULE
11 MOLD
13 YEASTS
15 SPORE
17 RABIES
18 FLAGELLUM
19 POTENT
20 VIRUS
21 PHAGOCYTOSIS
22 GRAMSTAIN
23 TYPHUS
1 ENDOTOXIN
2 MICROBIOLOGY
3 OPTIMUM
4 SAPROPHYTE
7 PARASITE
8 EXOTOXIN
9 METAZOA
12 BACTERIOLOG
14 STREPTO
15 SYMBIOSIS
16 FLORA

Student Supplement 2

a. 1
b. 3
c. 4
d. 2
e. 4
f. 1
g. 2
h. 5
i. 4
j. 1

Answers to Student Supplements

Student Supplement 3

a.	6
b.	12
c.	2
d.	9
e.	5
f.	10
g.	7
h.	18
i.	4
j.	19
k.	13
l.	14
m.	16
n.	20
o.	1
p.	3
q.	8
r.	11
s.	17
t.	15

Introduction of Microbiology
Unit 1-D

Answers to Written Test

1. a. 17
   b. 16
   c. 5
   d. 10
   e. 23
   f. 26
   g. 7
   h. 6
   i. 27
   j. 31
   k. 24
   l. 25
   m. 4
   n. 2
   o. 3
   p. 28
   q. 19
   r. 13
   s. 15
   t. 29
   u. 20
   v. 8
   w. 14
   x. 18
   y. 11
   z. 30

2. c, d, e, g, i

3. a. 5
   b. 3
   c. 1
   d. 4

4. c, d, f

5. a. 1
   b. 2
   c. 3
   d. 3
   e. 1
   f. 2
   g. 2
   h. 1

6. a, d, e, f

7. a, b, d, g, i

8. c, e, f

9. a. 6
   b. 7
   c. 3
   d. 2
   e. 5
   f. 1
   g. 4

10. a. 2
    b. 3
    c. 1

11. a. EX
    b. EN
    c. EN
    d. EX
    e. EX

12. c, d, g, h

Answers to Written Test

13.

a.	12	f.	11	k.	2
b.	13	g.	5	l.	6
c.	7	h.	1	m.	14
d.	8	i.	4	n.	15
e.	10	j.	3		

14. a. Viruses
    b. Parasites
    c. Insects or animal vectors such as lice, mice, fleas, rats, and ticks
    d. Rocky Mountain spotted fever

15. c, d, e

16. a. An electron
    b. Complex
    c. Parasites
    d. Spherical in shape
    e. Rod-shaped
    f. No
    g. Inclusion bodies
    h. Blocks
    i. By both direct and indirect

17. Note: The students may list other viral diseases that were not included in this unit. Evaluate them on an individual basis.

    a. Any two of the following:

    (1) Smallpox — *Variola* virus
    (2) Chickenpox — *Varicella* virus
    (3) Measles — *Rubeola* virus
    (4) German measles — *Rubella* virus
    (5) Fever blisters — *Herpes simplex* virus
    (6) Shingles (Herpes zoster) — *Varicella-zoster* virus

    b. Any two of the following:

    (1) Common cold (coryza)
    (2) Influenza
    (3) Infectious mononucleosis
    (4) Viral pneumonia

Answers to Written Test

c. Any two of the following:

   (1) Poliomyelitis
   (2) Rabies
   (3) Encephalitis

d. Any two of the following:

   (1) Mumps
   (2) Hepatitis
   (3) Yellow fever

e. AIDS — HIV

18. a, c

19. a. HIV
    b. Years
    c. Immune
    d. Kaposi's sarcoma
    e. Fatal

Introduction of Microbiology
Unit 1-D

Written Test

Name ______________________________ Score ______________

1. Match the terms on the right with the correct definitions.

______a. Minute living body not perceptible to the naked eye

______b. Study of microorganisms

______c. Study of bacteria

______d. Having the capability to live under certain environmental circumstances, but living under those circumstances is not compulsory

______e. Compulsory

______f. Study of parasites

______g. Method of asexual reproduction in which the cell divides into two parts

______h. Virus that attacks bacteria

______i. Disease-causing microorganism

______j. Relative power of a pathogen to cause disease

______k. Microorganism which causes infection when given the opportunity by the altered physiological state of the host

______l. Organism that lives within, upon, or at the expense of another living organism known as the host

______m. Capable of growing in absence of organic compounds; self-nourishing

1. Acid-fast
2. Aerobe
3. Anaerobe
4. Autotrophic
5. Bacteriology
6. Bacteriophage
7. Binary fission
8. Budding
9. Culture
10. Facultative
11. Flagellum
12. Gram stain
13. Heterotrophic
14. Inclusion bodies
15. Microaerophilic

Written Test

_______n. Microorganism that requires oxygen to live

_______o. Microorganism that lives without oxygen

_______p. Genetic factor that makes it possible for some bacteria to become resistant to certain antibiotics

_______q. Study of fungi

_______r. Requiring organic compounds to live and grow

_______s. Microorganism that requires oxygen, but thrives best when oxygen is less than that in the atmosphere

_______t. Organism living on decaying or dead organic matter

_______u. Any disease induced by a fungus

_______v. Method of asexual reproduction in which a budlike process grows from the side or end of the parent and develops into a new organism

_______w. Small, round bodies found in cells affected by a virus

_______x. Science of structure and form

_______y. Hairlike, motile process on the extremity of a bacterium or a protozoan

_______z. Study of viruses

16. Microbiology
17. Microorganism
18. Morphology
19. Mycology
20. Mycosis
21. Normal flora
22. Nosocomial infection
23. Obligate
24. Opportunistic microorganism
25. Parasite
26. Parasitology
27. Pathogen
28. Resistance-transfer factor
29. Saprophyte
30. Virology
31. Virulence

Written Test

2. Select major classes of microorganisms by placing an "X" in the appropriate blanks.

Note: Select only the major classes, not specific types.

______a. Cocci

______b. Spirillae

______c. Viruses

______d. Rickettsiae

______e. Fungi

______f. Bacilli

______g. Protozoa

______h. Molds

______i. Bacteria

______j. Anaerobes

______k. Clostridium

3. Match microbial relationships on the right with the correct descriptions.

______a. One organism receives benefit from another organism, but causes it no harm

______b. One organism derives benefit from another organism, at the other's expense

______c. One organism produces substances or causes conditions which are lethal for other organisms

______d. Two different kinds of organisms living independently without affecting the other

1. Antibiosis
2. Mutualism
3. Parasitism
4. Independence
5. Commensalism

Written Test

4. Select true statements concerning characteristics of protozoa by placing an "X" in the appropriate blanks.

______a. Are multicellular

______b. Are simple forms of plant life

______c. Are microscopic

______d. Take their food in solid particles

______e. Are nonmotile

______f. Reproduce sexually or asexually by fission

______g. When subjected to adverse conditions, they become very active.

5. Match protozoan diseases on the right with the correct causes and characteristics.

______a. Transmitted by the bite of a female *Anopheles* mosquito or by a contaminated hypodermic needle or blood transfusion

______b. Caused by *Entamoeba histolytica*

______c. Characterized in women by vaginitis with a profuse, cream-colored, foul-smelling discharge

______d. Transmitted by sexual intercourse, contaminated douche equipment, contaminated examination instruments, and contaminated towels

______e. Characterized by chills and fever

______f. Occurs following fecal contamination of food or drink

______g. Symptoms are intense diarrhea with bloody, mucous-filled stools

______h. Caused by a parasite of the *Plasmodium* genus (several species)

1. Malaria
2. Amebic dysentery
3. Trichomonas infection

Written Test

6. Select true statements concerning characteristics of fungi by placing an "X" in the appropriate blanks.

______a. Include yeasts and molds

______b. Are in the animal kingdom

______c. Contain chlorophyll

______d. Contain over 100,000 species

______e. Some are a common sight on stale bread, rotten fruit, or damp leather.

______f. Exist as parasites or saprophytes

______g. Most medically important fungi are visible to the naked eye.

7. Distinguish between characteristics of yeasts and molds and their mycoses by placing an "X" next to those of molds.

______a. Are characterized by a fuzzy growth of interlacing filaments called hyphae

______b. Reproduce by spores

______c. Reproduce by budding

______d. Some may be seen on foods such as bread and cheese.

______e. Some are used commercially in preparing beer, wine, and breads.

______f. Are unicellular, microscopic organisms

______g. Are multicellular

______h. A common mycosis of this is caused by *Candida albicans*.

______i. A common mycosis of this is caused by *Tinea capitis*.

Written Test

8. Select true statements concerning characteristics of bacteria by placing an "X" in the appropriate blanks.

   ______a. Are multicellular

   ______b. Are complex, animal organisms

   ______c. Ordinarily do not contain chlorophyll

   ______d. Have approximately 150 known species and are found only on food

   ______e. Only about 100 species produce disease in human beings

   ______f. Are classified as pathogenic or nonpathogenic

   ______g. Pathogenic bacteria are essential for life and aid in production of some foods and chemicals such as cheeses, sauerkraut, cultured milk products, and lactic acid.

   ______h. Reproduce asexually by budding

   ______i. Have no cell wall

9. Match types of bacteria on the right with the correct descriptions of their shapes.

   ______a. Rod or cylinder shapes that appear in chains

   ______b. Longer, rigid, curved organism, usually with several spirals and several flagella

   ______c. Sphere or round forms that arrange themselves in grapelike clusters

   ______d. Sphere or round forms that appear in pairs

   ______e. Rod or cylinder shapes that appear in pairs

   ______f. Short, slightly bent, comma-shaped rod

   ______g. Longer, flexible, and motile spiral organism

   1. Vibrio
   2. Diplococci
   3. Staphylococci
   4. Spirochete
   5. Diplobacilli
   6. Streptobacilli
   7. Spirillum
   8. Streptococci

Written Test

10. Match specialized structures of bacteria on the right with the correct descriptions.

______a. Are round structures of condensed protoplasm that are formed within the bacteria

______b. Are layers that surround many bacterial cells and interfere with phagocytosis by white blood cells

______c. Are hair-like processes that cause the bacteria to move along in liquid by their wavelike rhythmic contractions

1. Flagella
2. Spores
3. Capsules

11. Distinguish between types of toxins produced by bacteria by placing an "EN" next to the endotoxins and "EX" next to the exotoxins.

______a. Diffuse out of the intact bacterial cells into the surrounding medium or tissue

______b. Are liberated only when the bacterial cell dies and disintegrates

______c. Examples are organisms which cause typhoid fever and bacillary dysentery.

______d. Examples are organisms causing tetanus, gas gangrene, diphtheria, and scarlet fever.

______e. Are the most potent toxins known

12. Select true statements concerning growth requirements of bacteria by placing an "X" in the appropriate blanks.

______a. All bacteria must have some oxygen to live.

______b. Moisture delays growth.

______c. Autotrophic bacteria use carbon dioxide and other inorganic compounds for food and are nonpathogenic.

______d. Heterotrophic bacteria require living or dead organic matter for food and are pathogenic.

______e. Parasites utilize dead organic matter for food.

______f. Saprophytes utilize living organic matter for food.

Written Test

______g. High heat destroys most bacteria.

______h. Most bacteria grow best close to the neutral point on the pH scale or slightly on the alkaline side.

______i. Acids do not affect the growth of bacteria.

______j. Most bacteria flourish in direct sunlight.

______k. Spores are killed by sunlight.

13. Match the pathogenic bacteria on the right with the correct diseases they cause.

______a. Most post-operative wound infections

______b. Strep throat, scarlet fever, pneumonia, glomerulonephritis, and rheumatic heart disease

______c. Gonorrhea

______d. Bacterial meningitis

______e. Typhoid fever

______f. Bacterial dysentery

______g. Gastroenteritis, urinary tract infections, pyelonephritis, and epidemic diarrhea in newborn nurseries

______h. Whooping cough

______i. Tetanus

______j. Gas gangrene

______k. Botulism

______l. Tuberculosis

______m. Syphilis

______n. Cholera

1. *Bordetella pertussis*
2. *Clostridium botulinum*
3. *Clostridium perfringens*
4. *Clostridium tetani*
5. *Escherichia coli*
6. *Mycobacterium tuberculosis*
7. *Neisseria gonorrhoeae*
8. *Neisseria meningitis*
9. *Pseudomonas aeruginosa*
10. *Salmonella typhi*
11. *Shigella dysenteriae*
12. *Staphylococcus aureus*
13. *Streptococcus pyogenes*
14. *Treponema pallidum*
15. *Vibrio cholerae*

Written Test

14. Complete the following statements concerning characteristics of rickettsiae and the diseases they cause by filling in the blanks with the correct word(s).

    a. Are much smaller than bacteria, but larger than ____________________

    b. Are ____________________ (can only grow inside living cells)

    c. Are transmitted to human beings by ____________________

    d. *Rickettsia ricketsii* (tick-borne) causes ____________________

    ____

15. Select true statements concerning characteristics of helminths by placing an "X" in the appropriate blanks.

    ______a. Are unicellular

    ______b. Are plant parasites

    ______c. Are animal parasites

    ______d. Are commonly called worms

    ______e. Are transmitted through fecal contamination or by eating some uncooked meats such as pork

16. Complete the following statements concerning characteristics of viruses by circling the correct answers.

    a. Smallest organism known; can only be seen with the aid of (an electron, a simple, a compound) microscope

    b. Are very (complex, simple)

    c. Are (saprophytes, parasites)

    d. Viruses of human beings and animals are generally (rod-shaped, spherical in shape).

    e. Viruses of plants are (rod-shaped, spherical in shape).

    f. Viruses have (many, no) metabolic functions of their own.

    g. (Bacteriophages, Inclusion bodies) are found in host cells that have been affected by a virus.

    h. Interferon (increases, blocks) the effect of the virus.

    i. Viruses are transmitted (only by direct, only by indirect, by both direct and indirect) contact.

Written Test

17. List viral diseases according to each type.

    a. Dermotrophic viruses

        (1) ______________________________

        (2) ______________________________

    b. Pneumotrophic viruses

        (1) ______________________________

        (2) ______________________________

    c. Neurotrophic viruses

        (1) ______________________________

        (2) ______________________________

    d. Viscerotrophic viruses

        (1) ______________________________

        (2) ______________________________

    e. Immunotrophic — ______________________________

18. Select true statements concerning the types of hepatitis by placing an "X" in the appropriate blanks.

    ______a. Chemically-induced hepatitis could be caused by alcohol.

    ______b. All hepatitis is contagious.

    ______c. Presently five hepatotropic viruses can cause hepatitis — HAV-HEV.

19. Complete the following statements concerning the characteristics of AIDS by circling the correct answers.

    a. AIDS is caused by (HIV, HBV).

    b. Patients infected with the virus may be asymptomatic for many (days, weeks, years) before they are diagnosed with AIDS.

    c. As the virus weakens the infected person's (circulatory, immune) system, various opportunistic infections, malignancies, or neurological diseases can occur.

    d. Evidence of (Kaposi's sarcoma, Louis-Bar syndrome) indicates a diagnosis of AIDS.

    e. AIDS is (fatal, curable).

***Permission to duplicate this test is granted.**

Introduction to Microbiology
Unit 1-D

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Research The Causes and Prevention of a Human Disease Rating ______

Comments: ____

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

____

Teacher Signature ______________________________ Date __________

Student Signature ______________________________ Date __________

***Permission to duplicate this form is granted.**

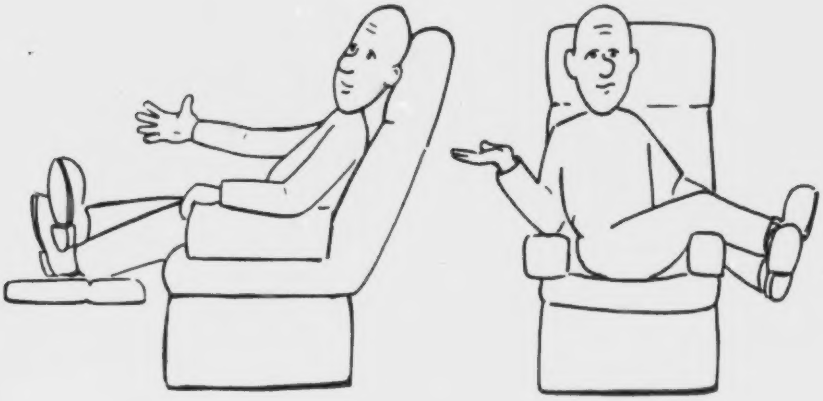
Introduction to Microbiology
Unit 1-D

Teacher Supplement 1—Pathogens That May Cause Nosocomial Infections

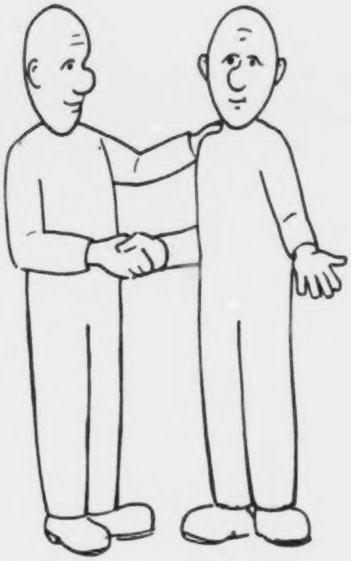
ORGANISMS	AEROBIC	GRAM STAIN	MORPHOLOGY
Staphylococcus aureus	yes	+	cocci
Streptococcus group B & D	yes	+	cocci
Streptococcus aureus (methicillin-resistant)	yes	+	cocci
Neisseria gonorrhoeae	yes	–	cocci
Mycobacterium	yes	–	bacilli
Escherichia coli	yes	–	bacilli
Pseudomonas aeruginosa	yes	–	bacilli
Hemophilus influenzae	yes	–	bacilli
Hemolytic and non-hemolytic *streptococci*	microaerophilic	+	cocci
Peptostreptococcus	anaerobic	+	cocci
Clostridium tetani	anaerobic	+	bacilli
Bacteroides fragilis	anaerobic	–	bacilli

Note: This list is by no means a complete list of pathogens responsible for nosocomial infections.

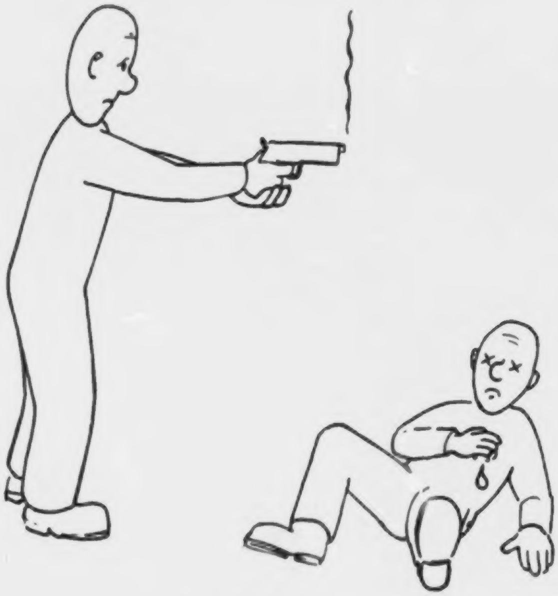
Relationships of Microorganisms



Independence

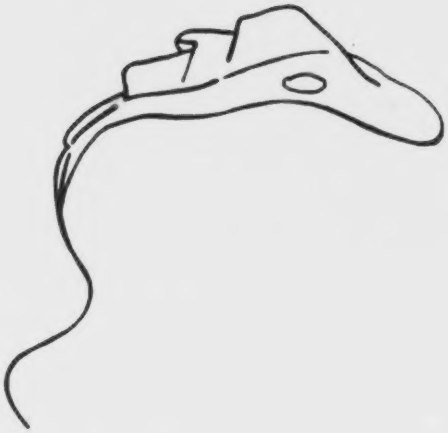


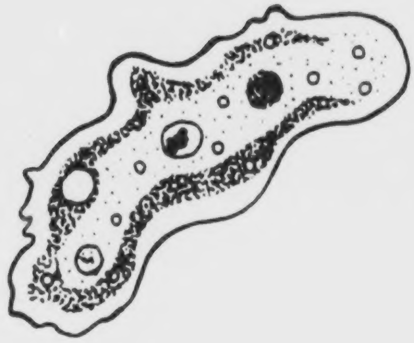
Symbiosis

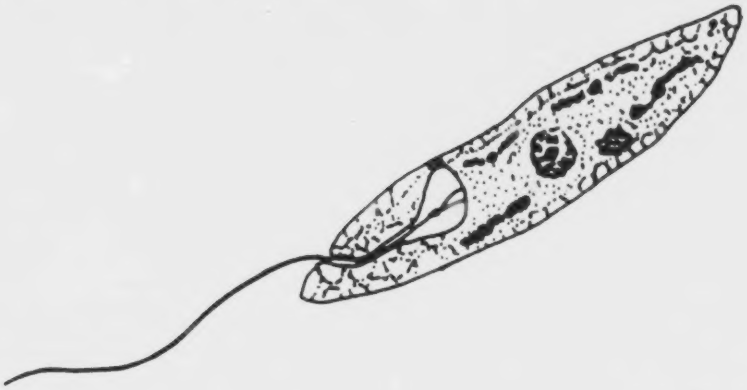


Antibiosis

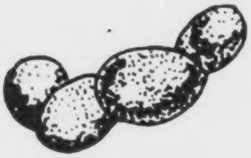
Protozoa



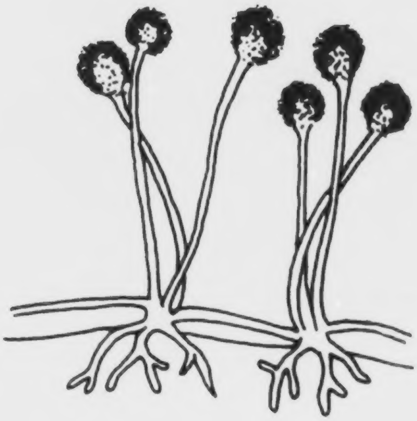




Fungi



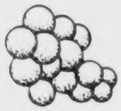
Yeast Cells



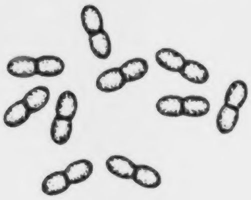
Molds

Bacteria

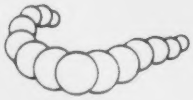
Sphere-Shaped Forms – Cocci



Staphylococci

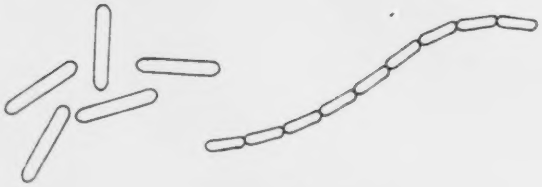


Diplococci

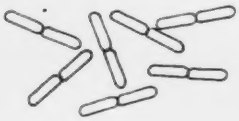


Streptococci

Rod-Shaped Forms – Bacilli

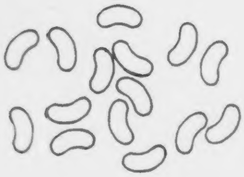


Streptobacilli

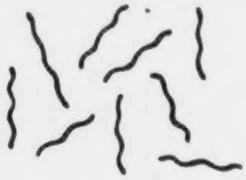


Diplobacilli

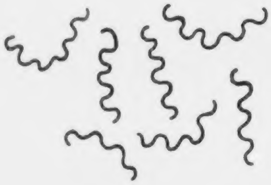
Spiral-Shaped Forms



Vibrios

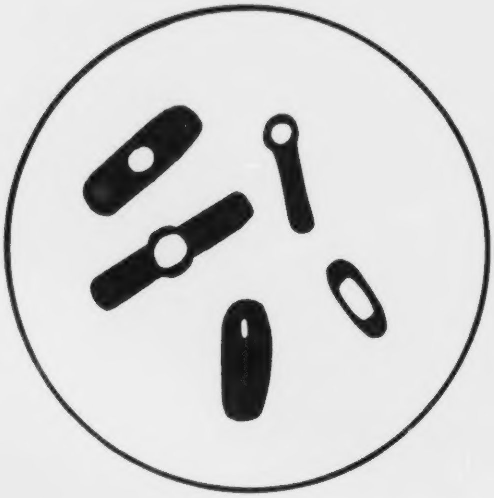


Spirilla

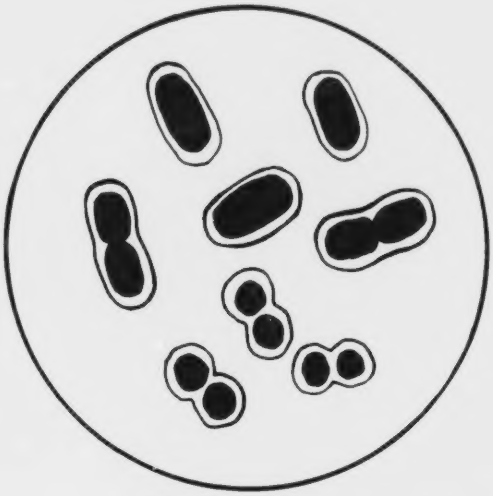


Spirochetes

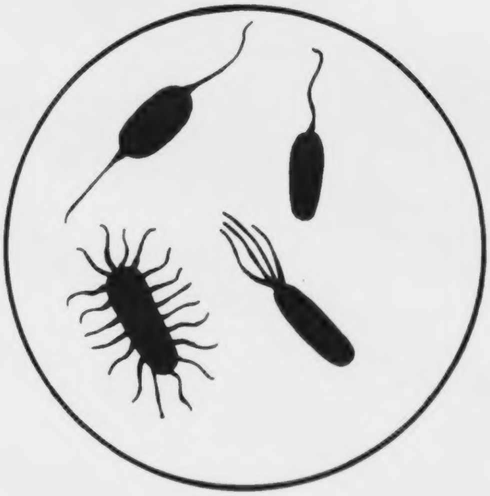
Specialized Structures of Bacteria



Spores
(white structures)

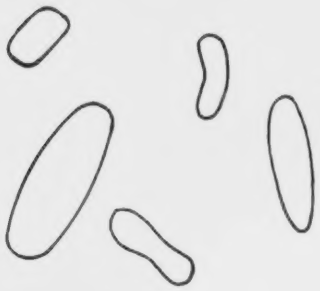


Capsules

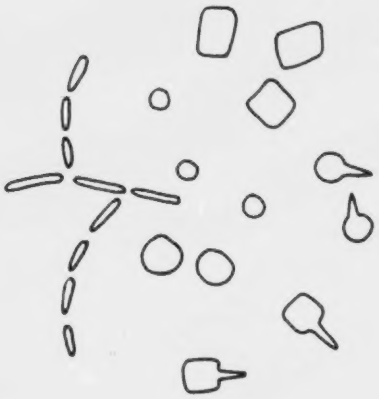


Flagella

Rickettsiae and Viruses
(As Seen Under an Electron Microscope)



Rickettsiae



Viruses

Introduction to Microbiology
Unit 1-D

Information Sheet

1. **Terms and definitions**

   a. **Acid-fast** — Laboratory technique to identify bacteria which consists of staining the bacteria and then rinsing with a mixture of acid and alcohol

   Note: Those bacteria that retain the stain and are not decolorized by the acid are called acid-fast.

   Example of acid-fact bacterium: *Mycobacterium tuberculosis*

   b. **Aerobe** — Microorganism that requires oxygen to live

   c. **Anaerobe** — Microorganism that lives without oxygen

   d. **Autotrophic** — Capable of growing in absence of organic compounds; self-nourishing

   e. **Bacteriology** — Study of bacteria

   f. **Bacteriophage** — Virus that attacks bacteria

   g. **Binary fission** — Method of asexual reproduction in which the cell divides into two parts

   h. **Budding** — Method of asexual reproduction in which a budlike process grows from the side or end of the parent and develops into a new organism

   i. **Culture** — Tissue sample, washing, or swabbing that is grown in a media under either aerobic or anaerobic conditions

   j. **Facultative** — Having the capability to live under certain environmental circumstances, but living under those circumstances is not compulsory

   Example: A facultative anaerobe prefers to live without oxygen, but can live with oxygen.

   k. **Flagellum** (pl. flagella) — Hairlike, motile process on the extremity of a bacterium or a protozoon

Information Sheet

l. **Gram stain** — Laboratory technique to identify bacteria which consists of staining bacteria with a violet stain and then counterstaining with a red stain

Note: Gram-positive bacteria will retain the violet stain. The gram-negative bacteria will adopt the red counterstain.

Examples of gram-positive bacteria:	*Streptococcus, Staphylococcus, Clostridium*
Examples of gram-negative bacteria:	*Pseudomonas, Proteus, Salmonella, Hemophilus*

m. **Heterotrophic** — Requiring organic compounds to live and grow

n. **Inclusion bodies** — Small, round bodies found in cells affected by a virus

o. **Microaerophilic** — Microorganism that requires oxygen, but thrives best when oxygen is less than that in the atmosphere

p. **Microbiology** — Study of microorganisms

q. **Microorganism** — Minute living body not perceptible to the naked eye

r. **Morphology** — Science of structure and form

s. **Mycology** — Study of fungi

t. **Mycosis** — Any disease induced by a fungus

u. **Normal flora** — Microscopic plant life such as bacteria which are adapted to residing in a given area of the body during health

Examples: Skin flora, intestinal flora, vaginal flora

Note: Normal flora live in a state of relative balance. Any condition such as excessive antibiotic intake that upsets this balance can cause an over-growth of other organisms in the area with resulting symptoms of disease.

v. **Nosocomial infection** — Infection acquired in a hospital

w. **Obligate** — Compulsory

Example: An obligate aerobe **must** have oxygen to live.

x. **Opportunistic microorganism** — Microorganism which causes infection when given the opportunity by the altered physiological state of the host

Information Sheet

y. **Parasite** — Organism that lives within, upon, or at the expense of another living organism known as the host

z. **Parasitology** — Study of parasites

aa. **Pathogen** — Disease-causing microorganism

bb. **Resistance-transfer factor** — Genetic bacterial factor that makes it possible for some bacteria to become resistant to certain antibiotics

Examples: Multiresistant strains of *Staphylococcus* and *Mycobacterium tuberculosis*

cc. **Saprophyte** — Organism living on decaying or dead organic matter

dd. **Virology** — Study of viruses

ee. **Virulence** — Relative power of a pathogen to cause disease

2. **Major classes of microorganisms**

   a. Protozoa

   b. Fungi

   c. Bacteria

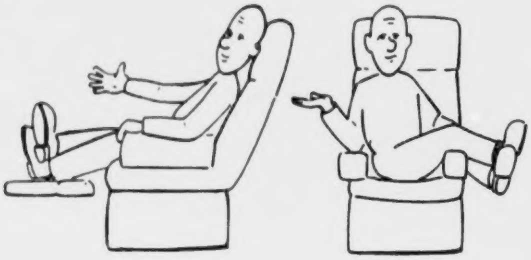
   d. Rickettsiae

   e. Viruses

3. **Microbial relationships**

   a. Independence — Two different kinds of organisms living independently without affecting the other

Figure 1



Information Sheet

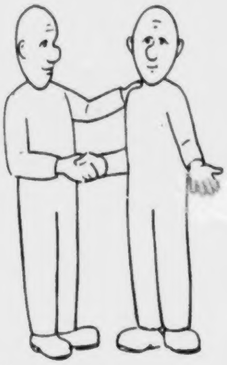
b. Symbiosis — Involves a close relationship between two organisms

  (1) Mutualism — Each organism derives some benefit from the other; mutually satisfied

  (2) Commensalism — One organism receives benefit from another organism, but causes it no harm

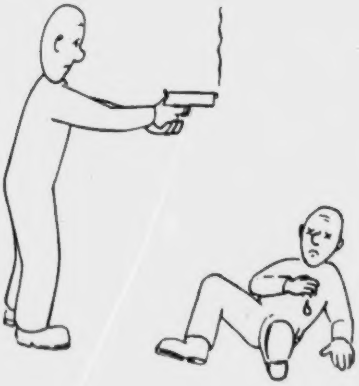
  (3) Parasitism — One organism derives benefit from another organism, at the other's expense

Figure 2



c. Antibiosis — One organism produces substances or causes conditions which are lethal for other organisms

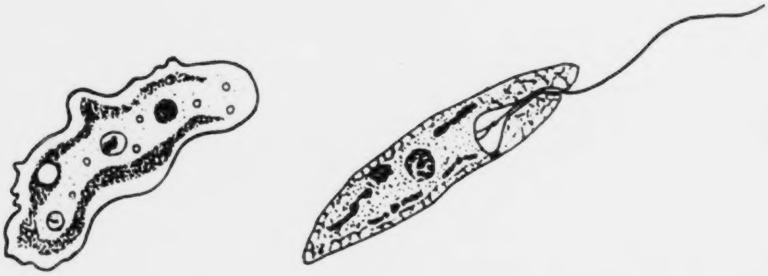
Figure 3



Information Sheet

4. Characteristics of protozoa

Figure 4



a. Are unicellular

b. Are simple forms of animal life

c. Are microscopic

d. Take their food in solid particles

e. Are motile using pseudopods, flagella, or cilia

f. Reproduce sexually or asexually by fission

g. When subjected to adverse conditions, they become inactive.

    (1) They assume a rounded form, and surround themselves with a heavy protective cell wall in a process called cyst formation.

    (2) They can live in the cyst form for a long time, and when conditions are right, return to a vegetative state.

5. Protozoan disease

a. Amebic dysentery

    (1) Caused by *Entamoeba histolytica*

    (2) Symptoms are intense diarrhea with bloody, mucous-filled stools

    (3) Occurs following fecal contamination of food or drink

b. Malaria

    (1) Caused by a parasite of the *Plasmodium* genus (several species)

    (2) Transmitted by the bite of a female *Anopheles* mosquito or by a contaminated hypodermic needle or blood transfusion

    (3) Characterized by chills and fever

Information Sheet

c. Trichomonas infection

  (1) Caused by *Trichomonas vaginalis*

  (2) Characterized in women by vaginitis with a profuse, cream-colored, foul-smelling discharge

  (3) Transmitted by sexual intercourse, contaminated douche equipment, contaminated examination instruments, and contaminated towels

6. Characteristics of fungi

a. Are in the plant kingdom

b. Lack chlorophyll

c. Contain over 100,000 species

d. Include yeasts and molds

e. Some fungi are a common sight on stale bread, rotten fruit, or damp leather.

f. Have to exist in one of two ways:

  (1) Parasite — Existing on another living organism

  (2) Saprophyte — Living on dead matter

g. Large fungi such as mushrooms and toadstools are visible to the naked eye.

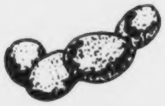
h. Most medically important fungi are microscopic.

Information Sheet

7. Characteristics of yeasts and molds and their mycoses

a. Yeasts

Figure 5



(1) Are unicellular, microscopic organisms

(2) Reproduce by budding

(3) Some are used commercially in preparing beer, wine, and breads.

(4) A common yeast mycosis is *Candida* infection caused by *Candida albicans*.

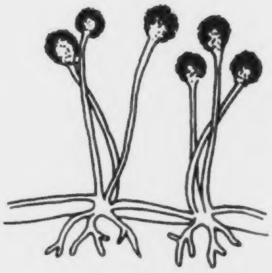
  (a) Infects mucous membranes of the mouth and is known as thrush
  (b) Infects female genitalia and is known as vulvovaginitis or vaginal thrush

  Note: Thrush is seen commonly in newborns infected by the mother.

Information Sheet

b. Molds

Figure 6



(1) Are multicellular

(2) Are characterized by a fuzzy growth of interlacing filaments called hyphae

(3) Reproduce by spores

(4) Some may be seen on foods such as bread and cheese.

(5) Ringworm of the scalp (*Tinea capitis*) and ringworm of the foot (*Tinea pedis* — athlete's foot) are common mycoses caused by molds.

8. Characteristics of bacteria

a. Are unicellular

b. Are simple plant organisms

c. Ordinarily do not contain chlorophyll

d. Have approximately 2000 known species and are found everywhere

e. Only about 100 species produce disease in human beings

f. Are classified in two ways:

(1) Pathogenic — Produce toxins which cause many diseases such as syphilis, gonorrhea, tuberculosis, typhoid and paratyphoid fevers, and whooping cough

(2) Nonpathogenic — Essential for life, assist in decomposition of matter, and aid in production of some foods and chemicals such as cheeses, sauerkraut, cultured milk products, and lactic acid

g. Reproduce asexually by binary fission

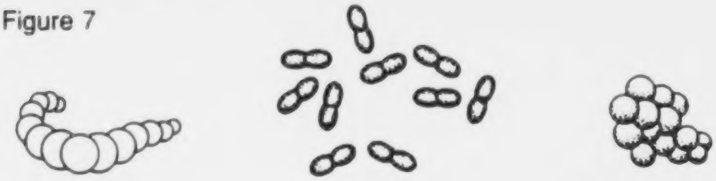
h. Have a rigid cell wall which blocks entrance of certain substances

Information Sheet

9. Types of bacteria according to their shapes (morphology)

a. Sphere or round forms — Coccus (plural—cocci)

Figure 7



Streptococci Diplococci Staphylococci

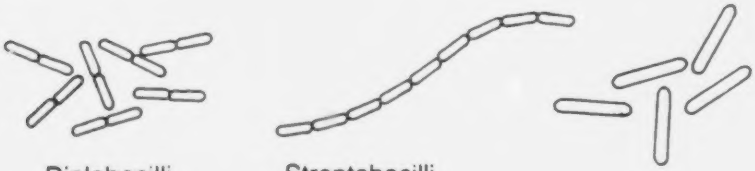
(1) Diplococci — Appear in pairs

(2) Streptococci — Cling together in long chains

(3) Staphylococci — Arrange themselves in grapelike clusters

b. Rod or cylinder shapes — Bacillus (plural—bacilli)

Figure 8



Diplobacilli Streptobacilli

Note: Some bacilli are long and slender, others short and plump and may be mistaken for cocci.

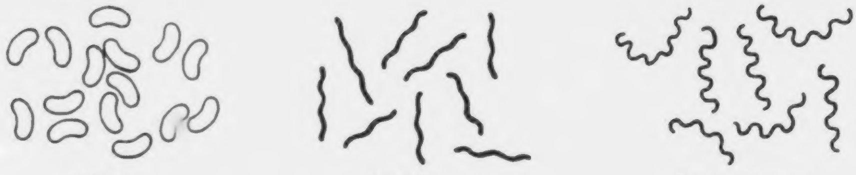
(1) Diplobacilli — Appear in pairs

(2) Streptobacilli — Appear in chains

Information Sheet

c. Spiral or curved forms

Figure 9



(1) Vibrio — Short, slightly bent, comma-shaped rod

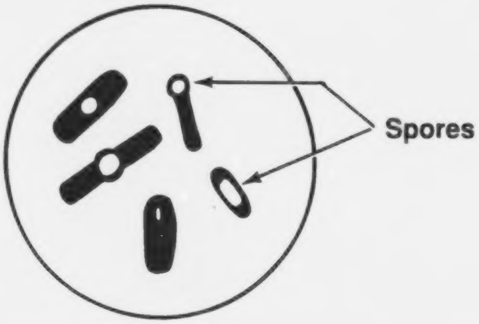
(2) Spirillum (plural—spirilla) — Longer, **rigid**, curved organism, usually with several spirals and several flagella

(3) Spirochete — Longer, **flexible**, and motile spiral organism

10. Specialized structures of bacteria

a. Spores

Figure 10



(1) Are round structures of condensed protoplasm that are formed within the bacteria

(2) Are produced by approximately 150 species of bacilli (not all species). Each bacillus forms one spore.

(3) Are inactive, dormant forms; not reproductive forms

Information Sheet

(4) Are capable of developing into a new vegetative organism under the right conditions

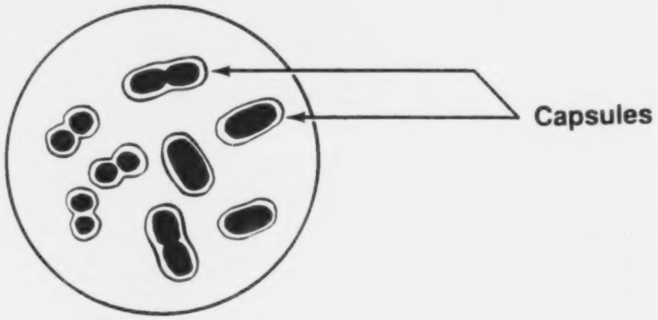
(5) Resist drying, boiling, and most chemical disinfectants

(6) Spore-forming pathogens include several *Clostridium sp.* which cause anthrax, botulism, tetanus, and gas gangrene.

(7) Autoclaving will destroy spores. Sterility may be defined as the absence of all microorganisms including spores.

b. Capsules

Figure 11



(1) Are layers that surround many bacterial cells

(2) Increase virulence of bacteria

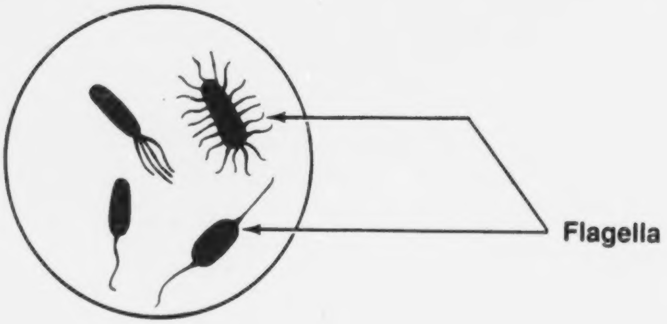
(3) Interfere with phagocytosis by white blood cells

(4) Aid in identification

Information Sheet

c. Flagella

Figure 12



(1) Are hair-like processes that cause the bacteria to move along in liquid by their wavelike rhythmic contractions

(2) Are present on bacilli and spirilla

Note: Cocci are not motile. Spirochetes are motile by rotating in a corkscrew fashion, not by use of a flagellum.

(3) Presence or absence aids in identification

11. Types of toxins produced by bacteria

a. Endotoxins

(1) Are contained in the bacterial cell walls

(2) Are liberated only when the bacterial cell dies and disintegrates

(3) When the endotoxin is liberated, it produces some of the symptoms of infectious diseases.

(4) Examples are organisms causing typhoid fever and bacillary dysentery.

Information Sheet

b. Exotoxins

   (1) Are the most potent toxins known

   (2) Diffuse out of the intact bacterial cells into the surrounding medium or tissue

   (3) Will produce most of the characteristic symptoms and lesions of the disease

   (4) Examples are organisms causing tetanus, gas gangrene, diphtheria, and scarlet fever.

12. Growth requirements of bacteria

a. Moisture

   (1) Favors growth

   (2) Drying may kill some bacteria.

   Note: Drying kills bacteria such as the organisms causing gonorrhea and syphilis. Others such as tuberculosis and staphylococcus can withstand drying for long periods and again become active.

b. Food

   (1) Autotrophic bacteria use carbon dioxide and other inorganic compounds for food and are nonpathogenic.

   (2) Heterotrophic bacteria require living or dead organic matter for food and are pathogenic.

      (a) Parasites utilize **living** organic matter for food.
      (b) Saprophytes utilize **dead** organic matter for food.

      Examples: Organisms causing tetanus, gas gangrene, and botulism

Information Sheet

c. Oxygen or lack of oxygen

(1) Aerobic bacteria must have oxygen to live.

Example: *Staphylococcus aureus* (responsible for skin and wound infections)

(2) Anaerobic bacteria cannot live in the presence of oxygen.

Examples: *Clostridium sp.* (causing tetanus, gas gangrene, and botulism)

Note: Tetanus and gas gangrene will not result from surface wounds. Both diseases result from deep puncture wounds or openings deep in tissue as occurs in surgery.

(3) Microaerophilic bacteria require oxygen less than that in the atmosphere.

Examples: Hemolytic species of *Streptococcus* (responsible for strep throat)

d. Moderate temperature

(1) High heat destroys most bacteria.

Note: Temperature necessary for destruction depends upon the organism involved.

(2) Freezing does not always destroy bacteria, but does reduce growth and metabolic activities.

(3) Most bacteria grow best at normal body temperature.

e. Neutral pH

(1) Most bacteria grow best close to the neutral point on the pH scale or slightly on the alkaline side.

(2) Both acids and alkalis are harmful to bacteria.

(3) Vinegar is acidic and may be used to decrease bacterial growth.

Examples: Pickling vegetables, using a vinegar douche

Note: Cranberry juice may be given to catheterized patients to make their urine more acidic, which will control the growth of bacteria in the area.

Information Sheet

f. Darkness

   (1) Most bacteria are killed by direct sunlight.

   (2) Spore formation is stimulated by sunlight (because the bacterium is stressed).

13. Pathogenic bacteria and diseases they cause

a. Cocci

   (1) Certain strains of *Staphylococci* — Cause food poisoning

   (2) *Staphylococcus aureus* — Causes most post-operative wound infections

   (3) *Streptococcus pyogenes* — Causes strep throat, scarlet fever, pneumonia, glomerulonephritis, and rheumatic heart disease

   (4) *Neisseria gonorrhoeae* — Causes gonorrhea

   (5) *Neisseria meningitis* — Causes bacterial (meningococcal) meningitis

b. Bacilli

   (1) *Salmonella typhi* — Causes typhoid fever

   (2) *Shigella dysenteriae* — Causes bacterial (bacillary) dysentery

   (3) *Escherichia coli* — Causes gastroenteritis, urinary tract infections, pyelonephritis, and epidemic diarrhea in newborn nurseries

   (4) *Corynebacterium diphtheriae* — Causes diphtheria

   (5) *Bordetella pertussis* — Causes whooping cough (pertussis)

   (6) *Clostridium tetani* — Causes tetanus (lockjaw)

   (7) *Clostridium perfringens* — Causes gas gangrene

   (8) *Clostridium botulinum* — Causes botulism

   (9) *Mycobacterium tuberculosis* — Causes tuberculosis

   (10) *Pseudomonas aeruginosa* — Can cause severe wound infections, urinary tract infections, osteomyelitis, meningitis, and septicemia when resistance of host is especially low, such as in burn patients

c. Spiral-shaped bacteria

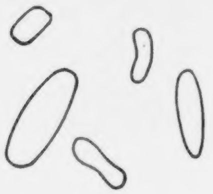
   (1) Spirochete — *Treponema pallidum* — Causes syphilis

   (2) Vibrio — *Vibrio cholerae* — Causes cholera

Information Sheet

14. Characteristics of rickettsiae and diseases they cause

Figure 13



a. Are much smaller than bacteria, but larger than viruses

b. Are parasites (can only grow inside **living** cells)

c. Are transmitted to human beings by insects or animal vectors such as lice, mice, fleas, rats, and ticks

d. *Rickettsia ricketsii* (tick-borne) causes Rocky Mountain spotted fever.

e. *Rickettsia typhi* causes endemic (flea-borne) typhus. *Rickettsia prowazekii* causes epidemic (louse-borne) typhus.

15. Characteristics of helminths

Note: Helminths are included in this unit on microbiology because they are microscopic in certain stages of their life cycle.

a. Are multicellular animal parasites

b. Are commonly called worms

c. Are the largest organisms responsible for human disease

d. Include

   (1) Roundworms

   (2) Pinworms

   (3) Hookworms

   (4) Trichinellae

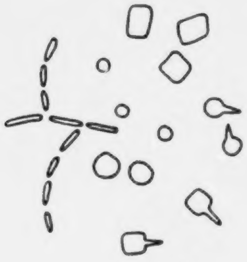
   (5) Flatworms (including flukes and tapeworms)

e. Are transmitted through fecal contamination or by eating some uncooked meats such as pork

Information Sheet

16. Characteristics of viruses

Figure 14



a. Smallest organism known; can only be seen with the aid of an electron microscope

Note: Approximately 2,500 viruses could fit on the tip of a pin.

b. Are highly complex

c. Are obligate intracellular parasites

d. Shapes vary greatly.

(1) Viruses of human beings and animals are generally **spherical** in shape.

(2) Viruses of plants are **rod-shaped** or many-sided.

(3) Viruses which attack bacteria are known as bacteriophages and are **rod-shaped**.

e. Viruses themselves have no metabolic functions; they borrow the ribosomes of the host cell to make new viruses.

f. Inclusion bodies are found in host cells that have been affected by a virus.

Note: Their presence helps the pathologist diagnose a viral disease.

g. Viruses may at times stimulate the affected cell to increase in number in a way the cells would not do if they did not contain a virus.

h. Viruses are transmitted by both direct and indirect contact.

Information Sheet

i. Relationship between viruses and interferon

   (1) Interferon is a protein produced by a normal body cell that is being attacked by a virus.

   (2) Interferon blocks the effect of the virus and is part of the body's defense against a viral infection.

   Note: Research is being done into "interferon inducers," substances that stimulate the cell to produce interferon, which would help to expand our control over viral diseases.

17. Viral disease according to type

a. Dermotrophic (affecting the skin and mucous membranes)

   (1) Smallpox — *Variola* virus

   (2) Chickenpox — *Varicella* virus

   (3) Measles — *Rubeola* virus

   (4) German measles — *Rubella* virus

   (5) Fever blisters (cold sores) — *Herpes simplex* virus

   (6) Shingles (Herpes zoster) — *Varicella-zoster* virus

b. Pneumotrophic (affecting the respiratory tract)

   (1) Common cold (coryza)

   (2) Influenza

   (3) Infectious mononucleosis

   (4) Viral pneumonia

c. Neurotrophic (affecting the central nervous system)

   (1) Poliomyelitis

   (2) Rabies

   (3) Encephalitis

Information Sheet

d. Viscerotrophic (affecting a specific organ)
    (1) Mumps
    (2) Hepatitis
    (3) Yellow fever

e. Immunotrophic (affecting the immune system)
    - AIDS — HIV

18. Types of hepatitis

a. Chemically-induced hepatitis
    (1) Caused by chemical toxins including alcohol
    (2) Is not infectious

b. Viral hepatitis
    (1) Caused by primary or secondary viruses
    (2) Two herpes viruses can result in secondary hepatitis.
    (3) Presently five hepatotropic viruses can cause hepatitis — HAV, HBV, HCV, HDV, and HEV.

19. Characteristics of AIDS

a. AIDS, which stands for Acquired Immune Deficiency Syndrome, is caused by HIV, human immunodeficiency virus.

b. Patients infected with HIV may be asymptomatic for many years before they are diagnosed with AIDS.

c. As the HI virus weakens the infected person's immune system, various opportunistic infections, malignancies, or neurological diseases can occur.

d. Evidence of these opportunistic diseases indicates a diagnosis of AIDS. These diseases include Kaposi's sarcoma, lymphoma of the brain, *Mycobacterium avium* complex or *M. kansasii* disease, *Pneumocystis carinii* pneumonia, toxoplasmosis of the brain, and several others.

e. AIDS is a fatal disease. Some patients live longer than five years, but in the U.S. about 50% of patients die within 18 months of diagnosis.

Introduction to Microbiology
Unit 1-D

Student Supplement 1—Complete a Crossword Puzzle of Microbiology Terms

Name ______________________________ Date ______________

Directions: Use the clues below to solve the crossword puzzle.

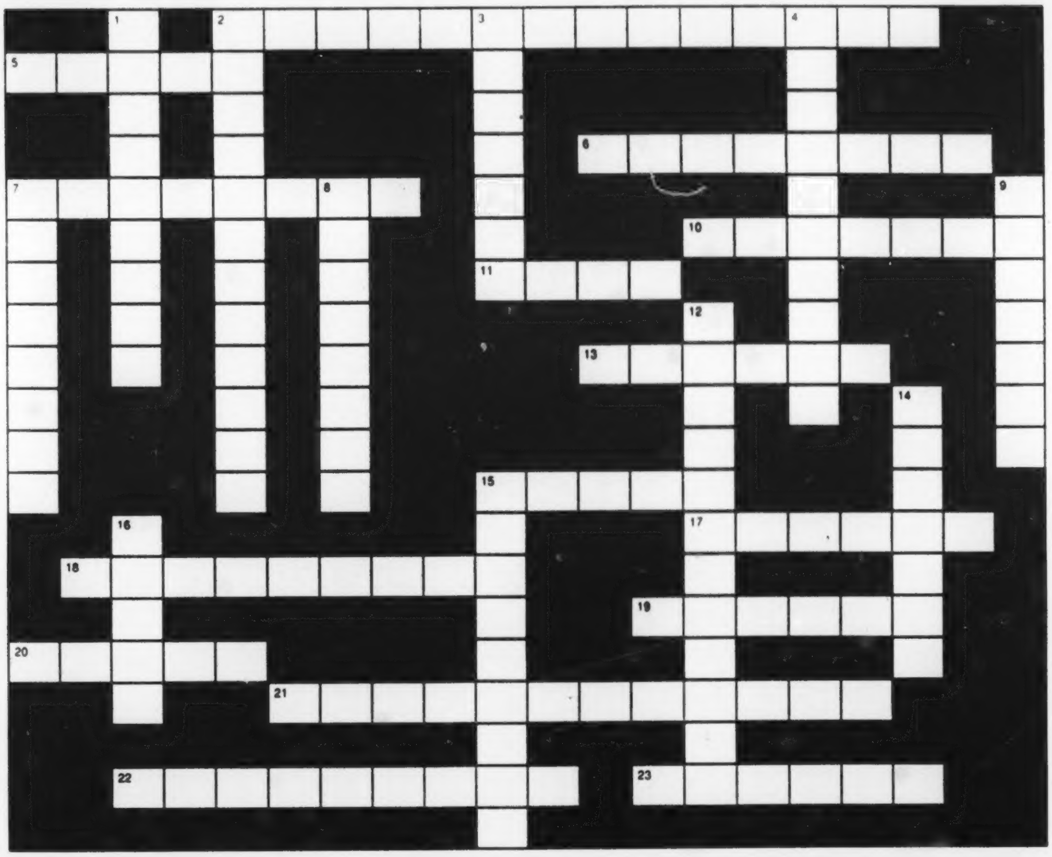
ACROSS

2. Can only be seen with the microscope
5. Plantlike, includes molds and yeasts
6. Thrives without the need for oxygen
7. Capable of causing disease
10. Interferes with phagocytosis and increases virulence of bacteria
11. Causes ringworm
13. From the fungi group, causes thrush
15. A specialized structure of some bacteria that resists the usual methods of disinfection
17. Neurotrophic virus spread by infected animals
18. Provides an organism with the ability to move
19. The degree of an organism to produce disease
20. Intracellular parasite
21. Cell eating
22. Usually the first test in identifying organisms
23. A disease caused by rickettsiae

DOWN

1. Poisonous substance confined within the body of a bacteria
2. The study of microorganisms
3. Most favorable
4. Lives on the dead remains
7. Requires a host to live, usually causing its (host) death
8. Poison excreted into the bacteria's surrounding
9. Helminths
12. Study of bacteria
14. ____________*-coccus pyogenes* may cause scarlet fever
15. Ability of microbes to live together
16. Refers to those organisms normally living in the body that do not usually cause disease

Student Supplement 1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Introduction to Microbiology
Unit 1-D

Student Supplement 2—Match Various Classes of Microorganisms With Their Characteristics

Name ______________________________ Date ______________

Directions: Match the major classes of microorganisms listed on the right with their correct characteristics.

Note: Some classes may match more than one characteristic.

______a. Smallest organisms known

______b. Are the simplest form of animal life

______c. Are unicellular plants that reproduce by binary fission

______d. Are plants that may or may not be microscopic

______e. Appear in sphere, rod, and spiral shapes

______f. A normal body cell will produce interfon when being attacked by this

______g. Include yeasts and molds

______h. Are parasites that are transmitted to humans by insects, lice, fleas, and ticks

______i. May produce a spore or capsule to protect itself

______j. Inclusion bodies are found in host cells that have been affected by this

1. Viruses
2. Fungi
3. Protozoa
4. Bacteria
5. Rickettsiae

Introduction to Microbiology
Unit 1-D

Student Supplement 3—Match Pathogenic Microorganisms With Their Diseases

Name ______________________________ Date ______________

Directions: Match the pathogenic microorganisms listed on the right with the correct diseases that they cause.

______a. Amebic dysentery

______b. Malaria

______c. Thrush and vaginal thrush

______d. Athlete's foot

______e. Gonorrhea

______f. Syphilis

______g. Bacterial dysentery

______h. Gastroenteritis, urinary tract infections, pyelonephritis

______i. Rocky Mountain spotted fever

______j. Shingles

______k. Tetanus

______l. Typhoid fever

______m. Chickenpox

______n. Whooping cough

______o. Scarlet fever, rheumatic heart disease

______p. Fever blisters

______q. Gas gangrene

______r. Severe wound infections, osteomyelitis, septicemia especially in burn patients

______s. Cholera

______t. Endemic typhus

1. *Streptococcus pyogenes*
2. *Candida albicans*
3. *Herpes simplex*
4. *Rickettsia ricketsii*
5. *Neisseria gonorrhoeae*
6. *Entamoeba histolytica*
7. *Shigella dysenteriae*
8. *Clostridium perfringens*
9. *Tinea pedis*
10. *Treponema pallidum*
11. *Pseudomonas aeruginosa*
12. *Plasmodium* genus (several species)
13. *Clostridium tetani*
14. *Salmonella typhi*
15. *Rickettsia typhi*
16. *Varicella*
17. *Vibrio cholerae*
18. *Escherichia coli*
19. *Varicella-zoster*
20. *Bordetella pertussis*

Introduction to Microbiology
Unit 1-D

Assignment Sheet 1—Research the Causes and Prevention of a Human Disease

Name ______________________________ Overall Rating __________

Evaluation criteria	Rating
Report includes important points mentioned	______
Report is neat and correct length	______
Report uses correct grammar, spelling, and punctuation	______
Report is concise	______

Directions: Research one human disease discussed in this unit. Determine what microorganism(s) causes the disease, effects of the disease, prevention of the disease (if possible), how it is transmitted to others, how transmission can be prevented, and how this disease will affect you as a surgical technologist. In your research, you may also find interesting facts about the disease, the microorganism, or its discovery that you could include in your report.

Now, prepare a 1-2 page paper presenting the results of your research. Your instructor may request written or oral reports. You may choose from the following list or others selected by you or your instructor. Have your instructor approve any topics not listed.

Possible Research Topics

Athlete's foot
Botulism
Chickenpox
Cholera
Common cold
Dysentery
Encephalitis
Fever blisters (cold sores)
Food poisoning
Gastroenteritis
German measles (Rubella)
Gonorrhea
Hepatitis
HIV and AIDS
Infectious mononucleosis
Influenza (various types)
Malaria
Measles (Rubeola)
Meningitis
Mumps
Pneumonia
Poliomyelitis
Rabies
Rheumatic fever
Ringworm
Shingles
Smallpox
Strep throat
Syphilis
Tetanus
Thrush or vaginal thrush
Trichinosis
Tuberculosis
Typhoid fever
Whooping cough
Yellow fever

The Infectious Process
Unit 2-D

Objective Sheet

Unit Objective

After completion of this unit, the student should be able to discuss the portals of entry and exit, distinguish between direct and indirect contact, and list means of controlling the transmission of infections. The student should demonstrate these competencies by completing the assignment sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to the infectious process with their correct definitions.
2. Select true statements concerning human portals of entry.
3. List human portals of exit.
4. Distinguish between direct and indirect contact in the transmission of pathogens.
5. Select factors influencing the occurrence of infection.
6. Match types of infections with the correct descriptions.
7. Distinguish between acute and chronic infections.
8. Match stages of acute infection with the correct descriptions.
9. Describe means of controlling the transmission of infections.
10. Determine human portals of entry and exit for various diseases and infections. (Assignment Sheet 1)

The Infectious Process
Unit 2-D

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Direct Contact (Objective 4)
   TM 2—Indirect Contact (Objective 4)
   TM 3—Indirect Contact (Objective 4)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheet. Review criteria for evaluation of this activity.

12. Discuss the student supplement. This could be used as a homework assignment, practice exercise, or quiz. Explain to students how you plan to evaluate the supplement, if at all.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Add any additional assignments.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Introduce the unit by sprinkling "Glo-Germ" powder, which will not be visible to the students on each student's desk prior to class. After a few minutes of class, stop and have students examine their hands and arms under the "Glo-Germ" light. This will illustrate how quickly some germs are spread and how crucial hands are to this transmission. Address for "Glo-Germ" follows in Suggested Supplemental Resources.

2. Invite an epidemiologist and/or a representative of a local hospital's infection control committee to talk to your class about ways of controlling the spread of infection in the hospital. **Communication skills**

3. Divide the class into groups and assign each a disease and have them discuss and present to the class the following:

   (a) Description of the disease and its course (acute or chronic)

   (b) Symptoms and phases

   (c) Type of disease (primary, etc.)

   (d) Mode of transmission

   (e) Portal of entry

   (f) Portal of exit

   (g) Precautions to prevent portal of entry and exit identifying those that are considered universal precautions

   This reinforces **group effectiveness skills**. This can be made into a written assignment as well as oral presentation to reinforce the **writing foundation skills**.

Suggested Activities

4. Review the unit by use of a game such as "Jeopardy" or "Family Feud" using Student Supplement 1 and questions from the unit exam. This reinforces **group effectiveness skills** and can be **motivation** to competitive students.

5. Show videos on the infectious process. Refer to Suggested Supplemental Resources. **Communication skills**

6. Have students prepare cultures from their hands for identification of organisms present. You may want to culture both washed and unwashed hands for comparison. Stress to students how hand washing is the most important means for controlling the transmission of infection. This activity reinforces **science foundation, problem-solving, motivation**, and **group effectiveness skills**.

7. Discuss pathogens common to the operating room environment. Refer to Teacher Supplement 1 for a partial listing. Discuss the transmission methods and how transmission can be prevented. **Communication skills** and **career development skills**.

8. Discuss the transmission of hepatitis and HIV. Teacher Supplements 2 and 3 provide more information on this. You may wish to make copies for the students for discussions and/or quizzes of the information. These are optional activities that could be used if time allows. **Reading foundation skills** and **communication skills**.

Resources Used in Developing This Unit

1. Atkinson, Lucy Jo. *Berry and Kohn's Operating Room Technique*, 7th edition. St. Louis, MO: C. V. Mosby Year Book, 1992.

2. Burton, Gwendolyn R. W. *Microbiology for the Health Sciences*, 4th ed. Philadelphia: J. B. Lippincott Company, 1992.

3. Meeker, Margaret H. and Jane C. Rothrock. *Alexander's Care of The Patient In Surgery*, 9th edition. St. Louis, MO: C. V. Mosby Year Book, 1991.

4. Warden-Tamparo, Carol and Marcia Lewis. *Diseases of the Human Body*. Philadelphia: F. A. Davis, 1989.

Suggested Activities

Suggested Supplemental Resources

1. Glo-Germ Company (for Glo-Germ powder required in Teaching Suggestion 1)
   P.O. Box 537
   Moab, UT 84532
   800-842-6622

2. American Liver Foundation (for free information about hepatitis)
   Cedar Grove, NJ 07009
   210-256-2550

3. *Programmed Instruction in Asepsis II* (free workbooks)
   Johnson & Johnson Medical Division—Professional Education
   Microbiology and Health Care
   Arlington, TX 76010
   817-465-3141

4. Newsletters

   a. *Clinical Microbiology Newsletter* (ISBN 0196-4399) Published twice monthly

      Elsevier Science Publishing Co.
      655 Avenue of the Americas
      New York, NY 10010

   b. *Infection Control Rounds* (complimentary subscription to health care professionals)

      3M Health Care Communications
      3M Center Bldg. 275-4E-01
      St. Paul, MN 55144-1000

5. Computer software

   a. *Infection Control: Principles and Practice*, 1993.

   b. *Universal Precautions Update*, 1992.

   Software listed in 5a and b are available from:

   Computerized Educational Systems
   307 Park Lake Circle
   P.O. Box 536905
   Orlando, FL 32853-6905
   800-275-1474

Suggested Activities

6. Videotapes

   a. *Bloodborne Pathogens in the Work Place: For Healthcare Facilities.* Available from:

      AIMS Media
      9710 DeSoto Avenue
      Chatsworth, CA 91311-4409
      800-367-2467

   b. *Infection Control: Break the Chain*, 1988. Available from:

      St. Clare Hospital
      515 22nd Avenue
      Monroe, WI 53566

   c. *Nosocomial Infection Control: Body Substance Isolation*, 28 minutes.

   d. *Nosocomial Infection and Medical Devices: Reducing the Risk*, 28 minutes.

   e. *Any Questions? The Universal Precautions Explained*, 15 minutes.

      c-e are available from:

      American Journal of Nursing Company
      Educational Services Division
      555 West 57th Street
      New York, NY 10019-2961
      800-CALLAJN (225-5256)

   f. *How Infection Strikes*, 20 minutes.

   g. *AIDS and Other Epidemics*, 26 minutes.

   h. *The Nature and Transmission of AIDS*, 20 minutes.

   i. *The Microbiology of AIDS*, 10 minutes.

      f-i are available from:

      Films for the Humanities and Sciences
      Box 2053
      Princeton, NJ 08543-2053
      800-257-5126 or 609-452-1128

Suggested Activities

j. *Tuberculosis: Prevention and Practices for Health Care Workers*, 1993, 22 minutes.

k. *Principles of Infection Control*, 1988, 21 minutes.

l. *Current Infection Control Guidelines for Healthcare Professionals*, 1988, 22 minutes.

m. *Handwashing, Sterile Techniques, and Changing a Dressing on an Infected Incision*, 1991, 27 minutes.

n. *Medical Asepsis*, 1988, 18 minutes.

j-n are available from:

Medcom/Trainex
P.O. Box 3225
Garden Grove, CA 92641
800-877-1443 or 714-891-1443

o. *Washing Hands*, 1992. Demonstrates the 30-second and 3-minute hand washings. Available from:

Insight Media
121 West 85th Street
New York, NY 10024
800-233-9910 or 212-721-6316

The Infectious Process
Unit 2-D

Answers to Student Supplement 1

1. c
2. a
3. d
4. b
5. b
6. c
7. a
8. d
9. c
10. a
11. a
12. d
13. d
14. d
15. a
16. a
17. a
18. b
19. c
20. a
21. a
22. b
23. d
24. b
25. d
26. d
27. c
28. a

The Infectious Process
Unit 2-D

Answers to Assignment Sheet 1

	Portal of Entry	Portal of Exit
1.	Broken skin	Blood and body fluids from infected wound
2.	Respiratory tract	Saliva and respiratory secretions (sputum)
3.	Alimentary tract	Fecal matter
4.	Through genitourinary tract (sexual contact), through broken skin to circulatory system, or directly to circulatory system through contaminated blood, body fluids, or instruments	Blood and body fluids
5.	Genitourinary tract or placenta	Semen and vaginal secretions
6.	Respiratory tract or placenta	Respiratory secretions or blood or body fluids from draining lesions
7.	Alimentary tract	Fecal matter
8.	Broken skin (usually must be deep wound)	Blood and body fluids from infected wound
9.	Through genitourinary tract (sexual contact), through placenta, through broken skin to circulatory system, or directly to circulatory system through contaminated blood, body fluids, or instruments	Blood and body fluids, including semen and vaginal secretions
10.	Respiratory tract	Respiratory secretions

The Infectious Process
Unit 2-D

Answers to Written Test

1. a. 15
   b. 1
   c. 5
   d. 11
   e. 4
   f. 9
   g. 3
   h. 13
   i. 14
   j. 23
   k. 16
   l. 20
   m. 19
   n. 7
   o. 25
   p. 10
   q. 24
   r. 22
   s. 17
   t. 21
   u. 6
   v. 2

2. a. T
   b. F
   c. F
   d. T
   e. T

3. Any five of the following:

   a. Blood
   b. Fecal matter (feces)
   c. Urine
   d. Respiratory secretions (sputum)
   e. Saliva
   f. Tears
   g. Semen and vaginal secretions
   h. Other body fluids that may contain infectious blood cells including cerebrospinal fluid, synovial fluid, pericardial fluid, peritoneal fluid, amniotic fluid, and breast milk

4. a, c, d

5. b, c, d, f

6. a. 3
   b. 4
   c. 1
   d. 2

7. a

Answers to Written Test

8. a. 4
   b. 1
   c. 2
   d. 3

9. Any three of the following for each category:

   a. Portal of entry

      (1) Wash hands.
      (2) Place sterile bandages over wounds.
      (3) Wear masks over nose and mouth.
      (4) Wear protective eyewear/face shields in case of splashing.
      (5) Use insect repellent.
      (6) Do not eat or drink contaminated food or beverages.
      (7) Properly clean after urination and defecation.
      (8) Have required vaccinations.
      (9) Use only sterile supplies for invasive procedures (injections, etc.).
      (10) Cleanse the proposed incision site.
      (11) Provide a sterile environment and supplies in surgery.

   b. Portal of exit

      (1) Bandage draining sores or wounds.
      (2) Wear gloves and change after contamination. Also wash hands after removing gloves.
      (3) Wear masks over nose and mouth.
      (4) Wear protective eyewear/face shields.
      (5) Wear protective aprons/gowns (impermeable clothing).
      (6) Properly handle/dispose of contaminated articles such as instruments, linens, etc. and medical waste products.
      (7) Properly handle/dispose of sharps (needles, blades).
      (8) Use "no touch" passing of sharp instruments and blades.
      (9) Decontaminate all surfaces and devices after use.

   c. Vectors or carriers of infection

      (1) Sterilize or disinfect fomites
      (2) Disinfect air
      (3) Use dust control measures
      (4) Properly handle food, water, and milk
      (5) Control insects
      (6) Vaccinate household pets for rabies

The Infectious Process
Unit 2-D

Written Test

Name ______________________________ Score ______________

1. Match the terms on the right with the correct definitions.

______a. Disease-causing microorganisms

______b. Absence of pathogens

______c. Transmission of microorganisms from person to person or from object to person and vice versa

______d. Invasion of the body by pathogens and the reactions of the tissues to their presence and their toxins

______e. Refers to a disease capable of being transmitted more or less rapidly to other persons; also called contagious

______f. Division of medical science concerned with defining and explaining the interrelationships of the host, agent, and environment in causing disease

______g. Persons who harbor pathogens without being sick themselves and who shed organisms into the environment

______h. Agent through which microorganisms are transmitted

______i. Microorganisms that do not normally invade tissue but that are capable of causing infection or disease when introduced mechanically or when host resistance is lowered

______j. Guidelines recommended by the Centers for Disease Control to prevent the transmission of blood-borne pathogens

1. Asepsis
2. Aseptic technique
3. Carriers
4. Communicable
5. Contamination
6. Decontamination
7. Droplet nuclei
8. Droplets
9. Epidemiology
10. Fomites
11. Infection

Written Test

_____k. Forming or containing pus: suppurative

_____l. Substance expelled by coughing or clearing the throat

_____m. Disease acquired as a result of sexual intercourse with an infected individual

_____n. Very small masses of liquid carried in a spray from the nose or mouth which evaporate before settling and remain suspended in the air

_____o. Relative power of a pathogen to cause disease

_____p. Inanimate objects which are freshly contaminated with secretions or excretions from an infected person or carrier

_____q. An animal, especially an insect, that transmits pathogens from infected to noninfected individuals

_____r. Process of sterilizing articles after they have been used and before putting them into circulation again

_____s. Destruction of bacteria through good cleaning processes or possibly by boiling in water

_____t. Not sterile, but as clean as possible

_____u. The process of removing organisms from articles, rooms, and linen after their use to make them safe to handle

_____v. Involves procedures that render and maintain an object or area completely free of pathogens

12. Medical asepsis
13. Medium
14. Opportunistic microorganism
15. Pathogens
16. Purulent
17. Sanitization
18. Sepsis
19. Sexually transmitted disease
20. Sputum
21. Surgically clean
22. Terminal sterilization
23. Universal precautions
24. Vector
25. Virulence

Written Test

2. Select true statements concerning human portals of entry by placing a "T" or "F" next to the true or false statements.

   ______a. A pregnant female infected with HIV can transmit the microorganism through the placenta to the fetus.

   ______b. Hepatitis B, HIV, yellow fever, and malaria use the alimentary tract as the portal of entry.

   ______c. Sexually transmitted diseases use the respiratory tract as the portal of entry.

   ______d. The skin must be broken to act as a portal of entry.

   ______e. Pneumonia, measles, tuberculosis, and the common cold usually enter the respiratory tract.

3. List five human portals of exit.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

   e. ______________________________

4. Distinguish between direct and indirect contact in the transmission of pathogens by placing an "X" next to the descriptions of indirect contact.

   ______a. Denotes the spread of contagious disease by some medium other than directly touching an infected person

   ______b. Transmission of a contagious disease by a healthy person coming in contact with a person who is a carrier of or has the disease

   ______c. Media include fomites and vectors

   ______d. Media include dirt and air molecules

Written Test

5. Select factors influencing the occurrence of infection by placing an "X" in the appropriate blanks.

______a. Layout of the operating room

______b. Portal of entry

______c. Resistance of host

______d. Number of organisms

______e. Size of organisms

______f. Virulence of the organism

6. Match types of infections on the right with the correct descriptions.

______a. One caused by more than one organism — 1. Primary

______b. One which is inactive or hidden — 2. Secondary

______c. First or original infection — 3. Mixed

______d. One which follows or complicates the original disease — 4. Latent

7. Distinguish between acute and chronic infections by placing an "X" next to the description of an acute infection.

______a. Runs a rapid and severe course terminating abruptly

______b. Runs a slow course over a long period of time; may last from weeks to years

Written Test

8. Match the stages of an acute infection on the right with the correct descriptions.

______ a. Short period, usually a day or less, when symptoms are vague or cause only mild discomfort

______ b. Period of actual illness with symptoms, degree of fever, and length of time depending upon the disease, condition of patient, and treatment

______ c. Begins with decline of fever and acute symptoms; length of time depends upon the severity of the acute stage, treatment, and general health of the patient

______ d. Period between entrance of organisms to the body and onset of symptoms

1. Acute
2. Convalescent
3. Incubation
4. Prodromal

9. Describe three means of controlling the transmission of infections for each category.

a. Portal of entry

(1) ______________________________

(2) ______________________________

(3) ______________________________

b. Portal of exit

(1) ______________________________

(2) ______________________________

(3) ______________________________

c. Vectors or carriers of infection

(1) ______________________________

(2) ______________________________

(3) ______________________________

***Permission to duplicate this test is granted.**

The Infectious Process
Unit 2-D

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Determine Human Portals of Entry and Exit for Various Diseases and Infections · Rating ______

Comments: ______________________________

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ______________________________

____

Teacher Signature ______________________________ Date __________

Student Signature ______________________________ Date __________

*Permission to duplicate this form is granted.

The Infectious Process
Unit 2-D

Teacher Supplement 1—Pathogens Common to the Operating Room Environment

Microorganism	Usual Environment	Transmission
Staphylococci	Skin, hair Upper respiratory tract	Direct contact Airborne
Escherichia coli	Intestinal tract Urinary tract	Feces, urine Direct contact
Streptococci	Oronasopharynx Skin, perianal	Airborne Direct contact
Tubercle bacillus (*Mycobacterium tuberculosis*)	Respiratory tract Urinary tract	Airborne, droplet Direct contact
Pseudomonas aeruginosa	Urinary tract Intestinal tract Water	Direct contact Urine, feces Water
Serratia marcescens	Urinary tract Respiratory tract	Direct contact Water
Clostridium	Intestinal tract	Direct contact
Fungi	Dust, soil Inanimate objects	Airborne Direct contact
Hepatitis virus	Blood Body fluids	Bloodborne Direct contact

The Infectious Process
Unit 2-D

Teacher Supplement 2—Types of Viral Hepatitis

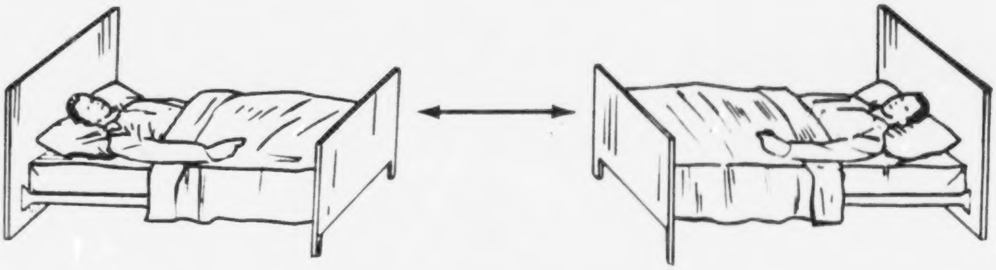
Virus	Transmission	Precaution/Prevention	Comments
Hepatitis A (HAV)	Oral/fecal	Good sanitation - hand washing	Usually see outbreaks associated with restaurant workers.
Hepatitis B (HBV)	Blood/STD	Protective Barriers - Universal Precautions Vaccine - series of 3	Of concern to OR personnel due to blood transmission. This disease can be fatal.
Hepatitis C (HCV)	Blood/transfusion associated	Protective Barriers - Universal Precautions	Of concern but is transfusion-associated and documentation does not indicate that it is a major threat to health care workers.
Hepatitis D (HDV)	Blood/co-infector with HBV	Protective Barriers - Universal Precautions Vaccine for HBV	One must have HBV for HDV to attack. It increases the severity and mortality of hepatitis.
Hepatitis E (HEV)	Oral/fecal	Good sanitation - hand washing	Seen in underdeveloped countries with poor sanitation as endemic.

The Infectious Process
Unit 2-D

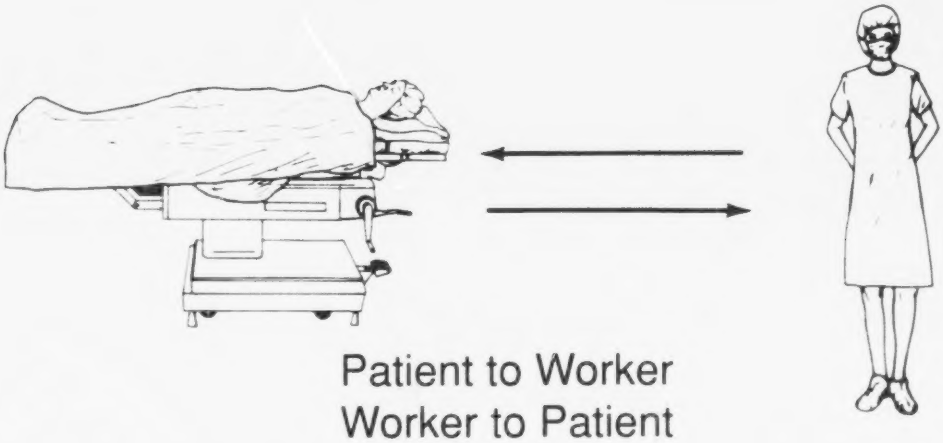
Teacher Supplement 3—Comparison of HIV and HBV

	HIV	HBV
Transmission	Sexual contact Parenteral Perinatal	Parenteral Sexual contact Perinatal
Incubation	5-6 days to get though blood stream 2 weeks to 2 months to show positive test Up to 10+ years asymptomatic	40-180 days
Symptoms	HIV + (asymptomatic) ARC Flu symptoms AIDS opportunistic diseases	⅓ asymptomatic Flu symptoms ACUTE jaundice
Prognosis	DEATH	Complete recovery - 6 months Chronic carrier Complications such as Cirrhosis Liver cancer Chronic liver disease DEATH

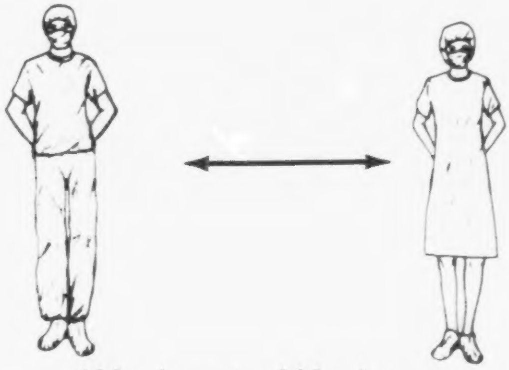
Direct Contact



Patient to Patient

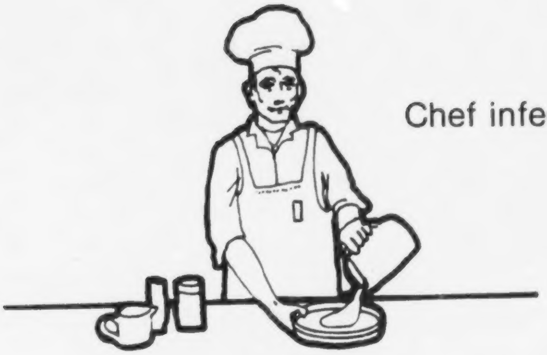


Patient to Worker
Worker to Patient



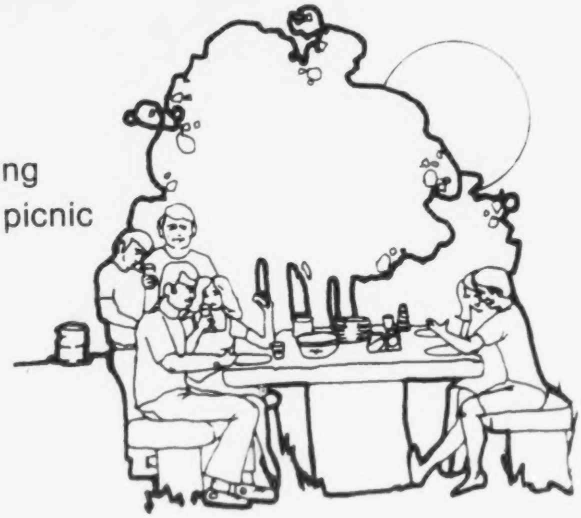
Worker to Worker

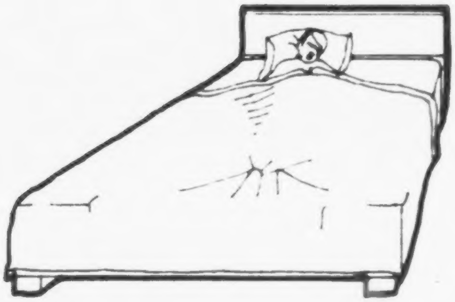
Indirect Contact
(Through Food)



Chef infected with *Staphylococci*

Pies purchased in morning and eaten at 5 p.m. at a picnic attended by 60 people

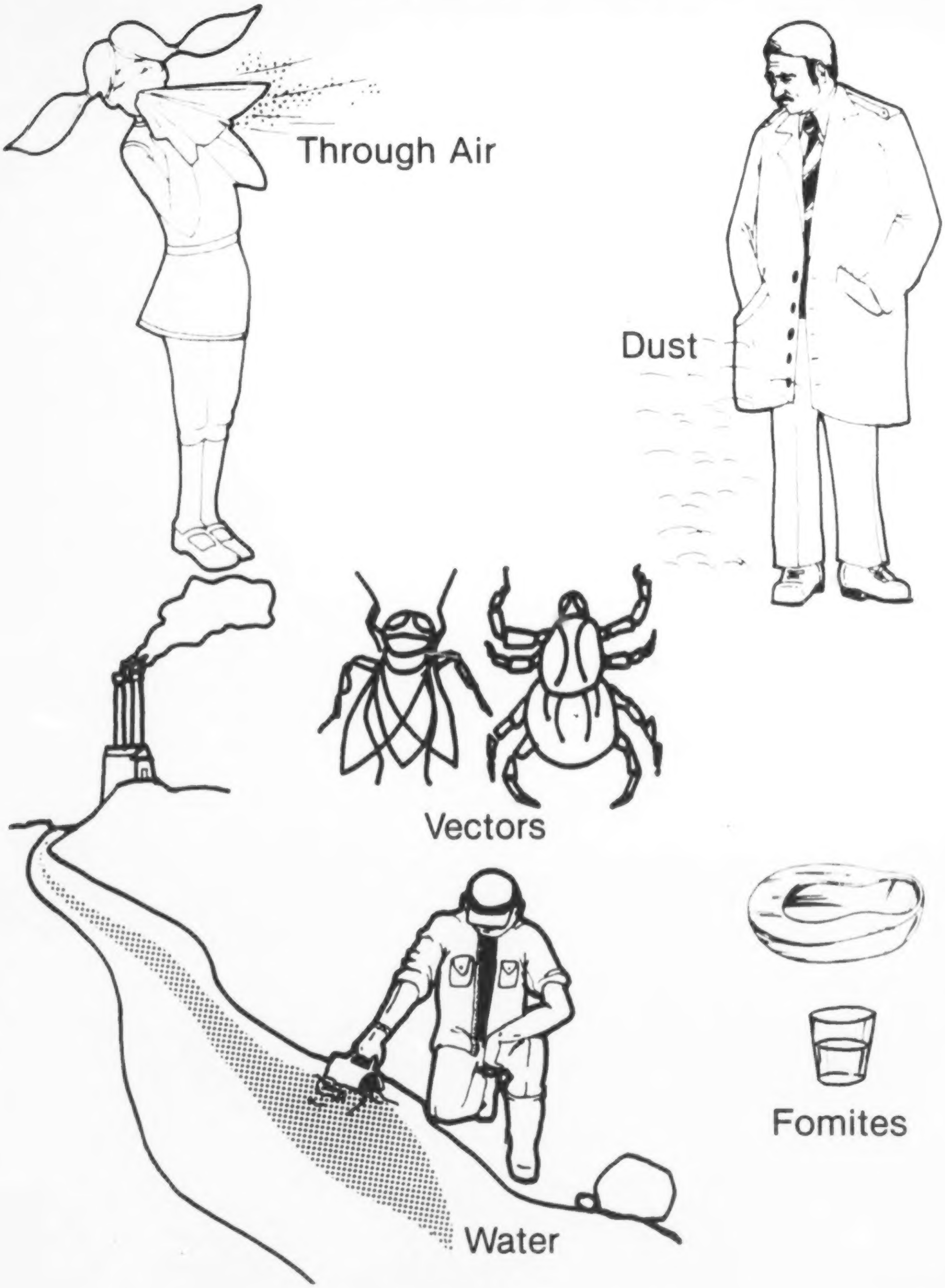




45 people ill with vomiting and diarrhea by evening

Indirect Contact

(Through Other Media)


Through Air
Dust
Vectors
Fomites
Water

The Infectious Process
Unit 2-D

Information Sheet

1. **Terms and definitions**

   a. **Asepsis** — Absence of pathogens

   b. **Aseptic technique** — Involves procedures that render and maintain an object or area completely free of pathogens

   c. **Carriers** — Persons who harbor pathogens without being sick themselves and who shed organisms into the environment

   d. **Communicable** — Refers to a disease capable of being transmitted more or less rapidly to other persons; also called contagious

   e. **Contamination** — Transmission of microorganisms from person to person or from object to person and vice versa

   f. **Decontamination** — The process of removing organisms from articles, rooms, and linen after their use to make them safe to handle

   Note: This may involve terminal sterilization.

   g. **Droplet nuclei** — Very small masses of liquid carried in a spray from the nose or mouth which evaporate before settling and remain suspended in the air

   h. **Droplets** — Very small masses of liquid carried in a spray from the nose or mouth which fall to surfaces upon expiration as liquid and which are not readily inhaled

   i. **Epidemiology** — Division of medical science concerned with defining and explaining the interrelationships of the host, agent, and environment in causing disease

   j. **Fomites** — Inanimate objects which are freshly contaminated with secretions or excretions from an infected person or carrier

   k. **Infection** — Invasion of the body by pathogens and the reactions of the tissues to their presence and their toxins

   l. **Medical asepsis** — Those procedures used to protect patient and environment from transmission of disease-producing organisms traveling from one patient to another

   m. **Medium** — Agent through which microorganisms are transmitted

Information Sheet

n. **Opportunistic microorganisms** — Microorganisms that do not normally invade tissue but that are capable of causing infection or disease when introduced mechanically or when host resistance is lowered

Example: *Tetanus bacillus* must be introduced by injury. On unbroken skin it will not cause infection.

o. **Pathogens** — Disease-causing microorganisms

p. **Purulent** — Forming or containing pus; suppurative

q. **Sanitization** — Destruction of bacteria through good cleaning processes or possibly by boiling in water

r. **Sepsis** — Disease condition denoting the presence of pathogenic bacteria and pus

s. **Sexually transmitted disease** (STD) — Disease acquired as a result of sexual intercourse with an infected individual

Examples: Syphilis, gonorrhea, chancroid, chlamydia, genital herpes, genital warts

t. **Sputum** — Substance expelled by coughing or clearing the throat

Note: Sputum may contain a variety of materials from the respiratory tract including cellular debris, mucus, pus, blood, and microorganisms.

u. **Surgically clean** — Not sterile, but as clean as possible

v. **Terminal sterilization** — Process of sterilizing articles after they have been used and before putting them into circulation again

w. **Universal precautions** — Guidelines recommended by the Centers for Disease Control (CDC) to prevent the transmission of blood-borne pathogens

Note: All health care workers must follow these universal precautions because every patient's blood, tissue, and body fluids are potentially infectious.

x. **Vector** — An animal, especially an insect, that transmits pathogens from infected to noninfected individuals

y. **Virulence** — Relative power of a pathogen to cause disease

Information Sheet

2. Human portals of entry

Note: Portals of entry are the specific pathways by which a microorganism enters the body to result in infection.

a. Skin

(1) Skin must be broken to act as an entry portal. Unbroken skin is the body's first line of defense against infection.

(2) Common microorganisms entering through the skin cause tetanus, gas gangrene, staphylococcal infection, and streptococcal infection.

Note: Generally, these are opportunistic microorganisms which pose no threat of infection unless the skin is broken.

b. Respiratory tract

(1) Many microorganisms enter through the mouth and nose into the respiratory tract

(2) This is the most frequent route of infection.

(3) Common microorganisms entering through this route cause tuberculosis, pneumonia, common cold, measles (rubeola), German measles (rubella), scarlet fever, and smallpox.

c. Alimentary tract

(1) A group of microorganisms known as intestinal or enteric microorganisms enter through the mouth into the stomach and gastrointestinal (GI) tract.

(2) Common microorganisms entering through this route include those causing typhoid fever, hepatitis A and E, bacillary and amebic dysentery, and cholera.

Note: These diseases are most commonly seen in areas with poor sanitation and are transmitted through contaminated food or water.

d. Genitourinary tract

(1) These enter through the mucous membranes of the urinary and/or reproductive systems.

(2) Common microorganisms entering through this route include those causing urinary tract infections, HIV (AIDS), and the sexually transmitted diseases.

Note: Urinary infections are usually the result of migration of microorganisms from the rectal area.

Information Sheet

e. **Placenta**

(1) Certain microorganisms from the pregnant mother will penetrate the placenta and infect the fetus.

(2) These include microorganisms that cause syphilis, HIV (AIDS), smallpox, and German measles.

f. **Circulatory system**

(1) These enter by invasion into the bloodstream.

(2) These microorganisms, including hepatitis B (HBV) and HIV, can be transmitted by contaminated blood transfusions, needlesticks, or cuts from sharp objects which had contaminated blood or body fluids.

(3) Some microorganisms, such as those causing yellow fever and malaria, may also be transmitted through bites by certain contaminated insects.

Note: HIV is not transmitted through insect bites.

3. Human portals of exit

Note: The pathway by which microorganisms leave the body depends largely on the part of the body affected by the disease. All body secretions and excretions are potential portals of exit if they contain any components of blood.

a. **Blood** — Includes microorganisms causing hepatitis B and HIV

Note: These are the "blood-borne pathogens" of major concern to health care workers.

b. **Fecal matter (feces)** — Includes microorganisms causing hepatitis, polio, and dysentery

c. **Urine** — Includes microorganisms causing typhoid fever

d. **Respiratory secretions (sputum)** — Includes microorganisms causing tuberculosis, pneumonia, and the common cold

e. **Saliva**

(1) Includes microorganisms causing strep throat and the common cold. HIV may be transmitted in saliva only if it contains blood.

(2) Rabies is the primary disease transmitted by the saliva of an infected animal.

Information Sheet

f. **Tears** — Includes microorganism causing conjunctivitis

g. **Semen and vaginal secretions** — Includes microorganisms causing HIV (AIDS) and sexually transmitted diseases

Note: Semen contains white blood cells.

h. **Other body fluids that may contain infectious blood cells include:**

(1) Cerebrospinal fluid

(2) Synovial fluid

(3) Pericardial fluid

(4) Peritoneal fluid

(5) Amniotic fluid

(6) Breast milk

4. **Transmission of pathogens**

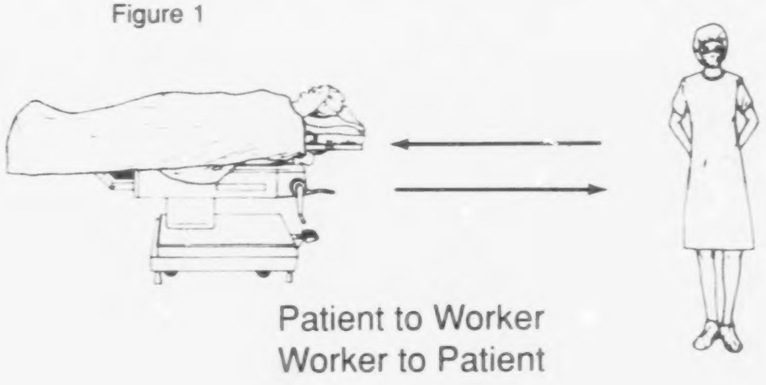
a. **Direct contact** (Figure 1)

(1) Transmission of a contagious disease by a healthy person coming in contact with a person who is a carrier of or has the disease

Example: Patient to worker, patient to patient

(2) Can also include direct animal-to-person contact

Figure 1



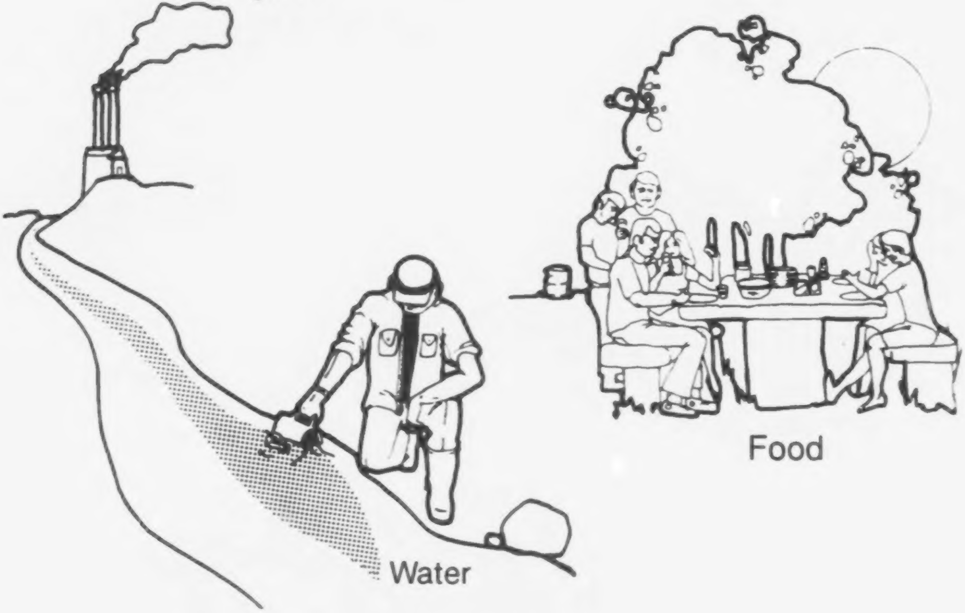
b. **Indirect contact** (Figures 2-6)

(1) Denotes the spread of contagious disease by some medium other than directly touching an infected person

(2) Media include:

(a) Contaminated food and water

Figure 2



(b) Fomites (inanimate objects)

Examples: Bedpans, sheets, drinking cups, tables

Figure 3

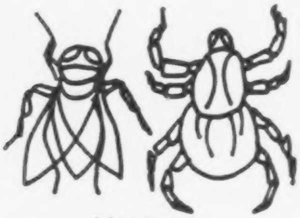
Information Sheet

(c) Vectors

Examples: Flies, ticks, mosquitos, mites

Note: Vectors may carry pathogens *inside* their bodies and transfer this biologically through a bite as in Rocky Mountain spotted fever, or they may carry pathogens *on* their bodies and simply mechanically transfer these microorganisms as when flies land on food.

Figure 4



Vectors

(d) Dirt, dust

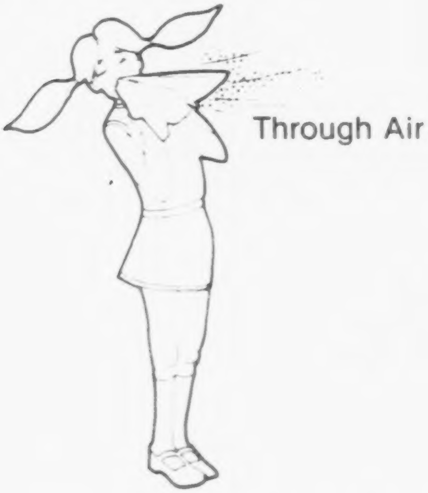
Figure 5

Information Sheet

(e) Air molecules

Note: Droplet nuclei are transmitted through air molecules.

Figure 6



5. Factors influencing the occurrence of infection

a. Portal of entry

Note: Most organisms will cause infection only when they enter a particular pathway. For example, swallowing malarial organisms would *not* cause the disease: they must enter through the bloodstream.

b. Number of organisms

Note: The normal body defenses can usually control a few organisms, but when large numbers are introduced, they usually cause an infection.

c. Virulence of the organism

Note: Organisms are more virulent if they produce hemolysins, coagulase, enzymes, endotoxins, or exotoxins. The presence of a capsule also increases the virulence.

d. Resistance of host

Note: Resistance determines whether or not infection will take place and the severity of the disease. Some individuals can withstand infection more easily than others. This has to do with their immunity which will be discussed in the next unit.

Information Sheet

6. **Types of infections**

   a. **Primary infection** — First or original infection

   b. **Secondary infection** — One which follows or complicates the original disease

      Note: This type of infection is usually caused by opportunist-type organisms.

   c. **Latent infection** — One which is inactive or hidden

      Examples: Early tuberculosis, tertiary syphilis, undulant fever, malaria

   d. **Mixed infection** — One caused by more than one organism

      Examples: Appendicitis, wound infections, trench mouth (Vincent's angina)

7. **Acute and chronic infections**

   a. **Acute** — Runs a rapid and severe course terminating abruptly

      Example: Lobar pneumonia

   b. **Chronic** — Runs a slow course over a long period of time; may last from weeks to years

      Examples: Tuberculosis, syphilis, fungal infections

      Note: In some cases, such as undulant fever, the disease begins as an acute infection, and if not properly treated, becomes chronic.

8. **Stages of an acute infection**

   a. **Incubation** — Period between entrance of organisms to the body and onset of symptoms

      Note: The length of incubation period varies with the type of disease.

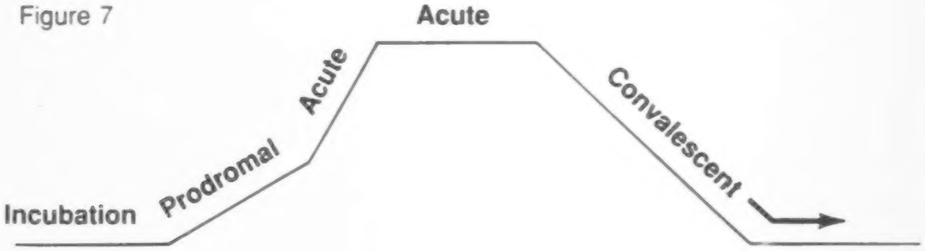
   b. **Prodromal** — Short period, usually a day or less, when symptoms are vague or cause only mild discomfort

   c. **Acute** — Period of actual illness with symptoms, degree of fever, and length of time depending upon the disease, condition of patient, and treatment

Information Sheet

d. **Convalescent** — Begins with decline of fever and acute symptoms; length of time depends upon the severity of the acute stage, treatment, and general health of the patient

Figure 7



9. Means of controlling the transmission of infections

a. Portal of entry

(1) Wash hands.

(2) Place sterile bandages over wounds.

(3) Wear masks over nose and mouth.

(4) Wear protective eyewear/face shields in case of splashing.

(5) Use insect repellent.

(6) Do not eat or drink contaminated food or beverages.

(7) Properly clean after urination and defecation.

(8) Have required vaccinations.

(9) Use only sterile supplies for invasive procedures (injections, etc.).

(10) Cleanse the proposed incision site.

(11) Provide a sterile environment and supplies in surgery.

Information Sheet

b. Portal of exit

(1) Bandage draining sores or wounds.

(2) Wear gloves and change after contamination. Also wash hands after removing gloves.*

(3) Wear masks over nose and mouth.*

(4) Wear protective eyewear/face shields.*

(5) Wear protective aprons/gowns (impermeable clothing).*

(6) Properly handle/dispose of contaminated articles such as instruments, linens, etc. and medical waste products.*

(7) Properly handle/dispose of sharps (needles, blades).*

(8) Use "no touch" passing of sharp instruments and blades.*

(9) Decontaminate all surfaces and devices after use.*

Note: * Indicates use of Universal Precautions.

c. Vectors or carriers of infection

(1) Sterilize or disinfect fomites

(2) Disinfect air

(3) Use dust control measures

(4) Properly handle food, water, and milk

(5) Control insects

(6) Vaccinate household pets for rabies

The Infectious Process
Unit 2-D

Student Supplement 1—Review the Infectious Process

Name ______________________________ Date ______________

Directions: Read each statement carefully and select the word that best completes the statements. Circle the correct letter or place the letter in the blank provided.

_____ 1. The period of an acute infection that usually lasts a day or less, when symptoms are vague, is the __________ period.

a. Acute
b. Incubation
c. Prodromal
d. Convalescent

_____ 2. An infection that follows or complicates the original disease is a __________ infection.

a. Secondary
b. Latent
c. Tertiary
d. Mixed

_____ 3. Appendicitis and most wound infections are referred to as __________ infections.

a. Secondary
b. Latent
c. Tertiary
d. Mixed

_____ 4. All of the following are means of controlling the transmission of infections through the portal of entry EXCEPT:

a. Hand washing
b. Dust control
c. Updated vaccinations
d. Protective eyewear

Student Supplement 1

_______ 5. Diseases capable of being transmitted from one person to another are referred to as

- a. Toxic
- b. Communicable
- c. Pathogenic
- d. Virulent

_______ 6. Procedures that render and maintain an object or area completely free of pathogens is

- a. Decontamination
- b. Septic procedures
- c. Aseptic technique
- d. Sanitation

_______ 7. All of the following are transmission by indirect contact EXCEPT

- a. People
- b. Contaminated food
- c. Ticks
- d. Droplets

_______ 8. An insect that transmits pathogens is a

- a. Carrier
- b. Fomite
- c. Medium
- d. Vector

_______ 9. When an object is as clean as possible, but not sterile, it is referred to as

- a. Aseptic
- b. Septic
- c. Surgically clean
- d. Very clean

_______10. One way to control the transmission of infection through vectors or carriers is to

- a. Disinfect fomites
- b. Wear protective clothing
- c. Bandage wounds
- d. Wash hands

Student Supplement 1

______11. The absence of pathogens is referred to as

a. Asepsis
b. Decontaminated
c. Sanitization
d. Sepsis

______12. An example of a fomite is

a. Skunk
b. Water
c. Flea
d. Bed sheet

______13. Factors that influence the occurrence of infection include:

a. Number of organisms
b. Host resistance
c. Microbial virulence
d. All of the above
e. None of the above

______14. HIV and hepatitis B are transmitted mainly by

a. Feces
b. Tears
c. Urine
d. Blood

______15. Which of the following statements is FALSE regarding the occurrence of infection?

a. Usually it only takes a few organisms to cause an infection.
b. Organisms will cause infection only when they enter a particular pathway.
c. Individual immunity determines whether or not an infection will take place.
d. Organisms are more virulent if they produce hemolysins, coagulase, and toxins.

______16. Which of the following statements about the skin as a portal of entry is FALSE?

a. The skin must be intact for infection to occur.
b. The skin must be broken for infection to occur.
c. Organisms that usually invade the skin are opportunistic.
d. Common infections that enter through the skin include tetanus and gas gangrene.

Student Supplement 1

______17. The portal of entry for typhoid fever and hepatitis A is

a. Alimentary tract
b. Genitourinary tract
c. Circulatory system
d. Respiratory tract

______18. All of the following terms describe an acute infection EXCEPT which one?

a. Terminates abruptly
b. Slow course
c. Rapid onset
d. Severe symptoms

______19. Which of the following statements BEST describes the treatment of body secretions and excretions?

a. Only body fluids that come from a person diagnosed with a known infection should be considered infectious.
b. Body fluids from a person suspected of infection should be handled differently than a person with a known infection.
c. All body fluids should be considered potentially infectious and treated the same.
d. All body fluids with visible red blood should be considered potentially infectious and treated as infectious.

______20. The portal of exit of microorganisms largely depends upon the

a. Area affected
b. Portal of entry
c. System structure
d. Microorganism toxicity

______21. A person who harbors pathogens without being sick is a

a. Carrier
b. Fomite
c. Medium
d. Vector

______22. The most common portal of entry for gonorrhea, syphilis, and AIDS is

a. Alimentary tract
b. Genitourinary tract
c. Circulatory tract
d. Respiratory tract

Student Supplement 1

______23. Microorganisms that do not normally invade healthy tissue but that are capable of producing disease are referred to as

a. Septic
b. Pathogenic
c. Communicable
d. Opportunistic

______24. Procedures used to protect patients and the environment from transmission of disease-producing organisms traveling from one patient to another is

a. Aseptic technique
b. Medical asepsis
c. Epidemiology
d. Sanitization

______25. The portal of entry that is the most frequent route for the common cold is the

a. Alimentary tract
b. Genitourinary tract
c. Circulatory tract
d. Respiratory tract

______26. Which of the following is an example of a chronic infection?

a. Common cold
b. Lobar pneumonia
c. Tonsillitis
d. Tuberculosis

______27. Disease-causing microorganisms are referred to as

a. Communicable
b. Contaminated
c. Pathogens
d. Virulent

______28. The period of an acute infection that is marked by fever and symptoms is the ____________ period.

a. Acute
b. Incubation
c. Prodromal
d. Convalescent

The Infectious Process
Unit 2-D

Assignment Sheet 1—Determine Human Portals of Entry and Exit for Various Diseases and Infections

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Portals of entry are correctly identified	______
Portals of exit are correctly identified	______

Directions: Determine how the following diseases and infections are transmitted. First determine how the patient contracted the disease (portal of entry) and then how they could contaminate others (portal of exit).

	Portal of Entry	Portal of Exit
1. Staphylococcal infection		
2. Tuberculosis		
3. Hepatitis A		
4. Hepatitis B		
5. Syphilis		
6. German measles		
7. Dysentery		
8. Tetanus		
9. AIDS (HIV)		
10. Common cold		

Body Defenses Against Disease
Unit 3-D

Objective Sheet

Unit Objective

After completing this unit, the student should be able to discuss body defenses against diseases and match types of immunities with their descriptions. The student should demonstrate these competencies by completing the assignment sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to body defenses against disease with their correct definitions.
2. Complete statements concerning body defenses against disease.
3. Select from a list the purposes of inflammation.
4. List symptoms of acute inflammatory response.
5. Select true statements concerning the treatment of acute inflammation.
6. Distinguish between the types of immune responses.
7. Select true statements concerning the types of immunity.
8. Match types of acquired immunity with the correct descriptions.
9. List types of vaccines.
10. Complete statements concerning the allergic response.
11. Complete statements concerning characteristics of anaphylaxis.
12. Select true statements concerning the rejection syndrome.
13. Complete a personal immunity survey. (Assignment Sheet 1)

Body Defenses Against Disease
Unit 3-D

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Types of Immunity (Objective 7)
   TM 2—Active Immunity (Objective 8)
   TM 3—Passive Immunity (Objective 8)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the assignment sheet. Review criteria for evaluation of this activity.

12. Discuss the student supplement. This could be used as a homework assignment, practice exercise, or quiz. Explain to students how you plan to evaluate the supplement, if at all.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Record assignment sheet ratings and written test scores on the Unit Evaluation Form. Add any additional assignments or supplemental activities that should be part of the unit evaluation.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Show videos on immunity and immune disorders. Refer to the Suggested Supplemental Resources. Discuss the importance of a healthy immune system and how the immune system fights diseases. This reinforces unit content and **listening communication skills**.

2. Play the "bid game" to review the content of this unit.

   a. Pass out 3×5 cards and have each student write two questions for each unit objective. The question should be put on one side and the answer on the back. The questions must be grammatically correct. Each question must be able to be answered with one or two words.

   b. Take up the questions and use them to play "bid."

      Note: It is best to have the questions handed in by the end of one class period for review the next. An option is to use your own questions.

   c. Divide the class into two teams. Each team chooses a captain. The captain is the only one that may talk to the teacher. He/She bids for and presents the team's answers.

   d. Both teams start with 500 points. The teacher prepares the question and assigns points for each question.

Suggested Activities

e. Announce the point value of the first question. The teams have 30 seconds to **WRITE** down their bid which is presented to the teacher by the captain.

f. The question is read and the highest bidding team is given 30 seconds to discuss and then answer the question. The captain must be the one to answer. If the team fails to correctly answer the question, it goes to the other team for the same number of points, and **the points are subtracted from the team with the incorrect answer**.

g. At the end of the time limit for the game, the team with the most points wins.

h. This activity can reinforce unit content through **communication skills** and **group effectiveness skills**. It also provides for auditory learning.

3. After completion of Assignment Sheet 1.

   a. Discuss the vaccinations that are required for health care workers. Also discuss why they may not have had all of the vaccinations listed on Assignment Sheet 1. For example, smallpox has been eradicated and HIB has only been recommended for infants since 1990.

   b. Encourage any student with severe allergic (anaphylactic) reactions to wear medical alert tags. Discuss how these can save lives.

4. Contact your local county, state, or federal health departments for up-to-date information about vaccinations recommended or required for health care workers.

   U.S. Department of Health and Human Services
   Public Health Service
   Centers for Disease Control
   Atlanta, GA 30333

Resources Used in Developing This Unit

1. Atkinson, Lucy. *Berry & Kohn's Operating Room Technique*, 7th edition. St. Louis: C. V. Mosby Co., 1992.

2. *Frobisher and Fuerst's Microbiology in Health and Disease*, 15th edition revised by Robert Fuerst. Philadelphia: W. B. Saunders Co., 1983.

3. Fuerst, Robert. *Lab Manual and Workbook for Microbiology in Health and Disease*, 7th edition. Philadelphia: W. B. Saunders Co., 1983.

4. Sanders, Tina and Valerie Scanlon. *Essentials of Anatomy and Physiology*. Philadelphia: F. A. Davis Co., 1991.

Suggested Activities

Suggested Supplemental Resources

1. *The Human Immune System: The Fighting Edge*. 52 minute videotape that discusses the immune system and tells the stories of four individuals whose immune systems failed to function properly.

2. *Immune System Disorders*. 28 minute videotape that discusses ailments and diseases resulting from the failure of the immune system.

3. *Lupus*. 30 minute videotape that discusses the causes and effects of this disease.

4. *Vaccines and Preventive Medicine*. 26 minute videotape that discusses the development and production of vaccines.

   1 - 4 are available from:

   Films for the Humanities and Sciences
   P.O. Box 2053
   Princeton, NJ 08543-2053
   800-257-5126 or 609-452-1128

5. *Body Against Disease*. 3 filmstrips or a 48-minute videotape which discuss the following areas: a. Disease and Defenses, b. The Immune Response, and c. The Body Against Itself. Colorful drawings and photomicrographs show the body's "computerized" ability to derive, store, and retrieve formulas for fighting infections and what happens when the immune system malfunctions. Available from:

   Opportunities for Learning, Inc.
   941 Hickory Lane
   P.O. Box 8103
   Mansfield, OH 44901-8103
   419-589-1700 or 800-243-7116

6. *Bodyguard: The Immune System Series*

   a. *The Invisible Protector*. 27 minute videotape discussing the teamwork involved in the immune system. Shows the role of antibodies and other body defenses. Also discusses how the body reacts to transplants, allergies, and diseases it cannot control.

   b. *Sexually Transmitted Diseases and AIDS*. 26 minute videotape shows how the immune system is involved in fighting sexually transmitted diseases and how the body's immune system can be destroyed by the HI virus, making the body unable to fight off even the most simple infections.

   This series (6a and 6b) is available from:

   Perennial Education
   1560 Sherman Avenue, Suite 100
   Evanston, IL 60201
   800-323-9084 or 708-328-6700

Body Defenses Against Disease
Unit 3-D

Answers to Student Supplement 1

1. c
2. c
3. b
4. d
5. d
6. a
7. b
8. d
9. a
10. d
11. c
12. b
13. b
14. a
15. d
16. a
17. d
18. d
19. b
20. a

Body Defenses Against Disease
Unit 3-D

Answers to Written Test

1.	a.	9	e.	20	i.	5	m.	15
	b.	10	f.	19	j.	17	n.	11
	c.	18	g.	4	k.	21	o.	6
	d.	7	h.	2	l.	3	p.	1

2. a. Mechanical barriers
   b. Inflammatory
   c. White
   d. White
   e. Skin

3. d, e, g, h

4. Any four of the following:

   a. Redness
   b. Heat
   c. Swelling
   d. Pain
   e. Disordered (impaired) function

5. c, d

6. a

7. b, c

8. a. 1
   b. 3
   c. 4
   d. 2

9. Any three of the following:

   a. Those containing living, attenuated pathogens
   b. Those containing killed (inactivated) pathogens
   c. Those containing soluble toxins or toxoids of pathogens
   d. Those containing extracts of pathogens (such as a bacterial capsule)

Answers to Written Test

10. a. Antigen—antibody
    b. Allergens
    c. First
    d. One of the following: itching, redness of skin, headache, breathing difficulties, or anaphylaxis
    e. Antihistamines
    f. One of the following: dust, perfume, or pollen
    g. One of the following: wheat, eggs, milk, chocolate, or strawberries
    h. One of the following: aspirin, various antibiotics, or serums
    i. One of the following: animals, plants, hair, or fur

    Note: Students may give different answers for d, f, g, h, and i, which may be correct if they could be considered "common." Evaluate them on an individual basis.

11. a. Severe
    b. Bronchiolar
    c. Dyspnea
    d. Minutes
    e. Epinephrine
    f. Serum

12. a, d, e

Body Defenses Against Disease
Unit 3-D

Written Test

Name ____ Score ________________

1. Match the terms on the right with the correct definitions.

______a. Not susceptible or responsive to a disease or having high degree of resistance to a disease

______b. The reaction of the body to a foreign substance or substance interpreted as foreign, usually with the production of antibodies

______c. A poisonous substance

______d. Bacterial toxins which are liberated only when the bacterial cell is destroyed

______e. Inoculation with a vaccine

______f. A toxin treated so as to destroy its toxicity, but still capable of inducing formation of antibodies on injection

______g. A substance which induces the formation of antibodies; may be introduced into the body or formed within the body

______h. Abnormal hypersensitivity by an individual to one or more substances

______i. An antibody capable of neutralizing a specific toxin

______j. Watery fluid taken from the blood of an animal rendered immune against a pathogenic organism which is injected into a patient to protect against the disease resulting from the pathogenic organism

1. Allergen
2. Allergy
3. Antibody
4. Antigen
5. Antitoxin
6. Attenuated
7. Endotoxins
8. Exotoxins
9. Immune
10. Immune response
11. Immunization
12. Immunology
13. Interferon
14. Lymphocyte
15. Macrophage
16. Phagocytosis

Written Test

______k. Suspension of infectious agents given to establish resistance to an infectious disease

______l. Protein substance developed by the body in response to the presence of an antigen that counteracts the antigen

______m. Type of white blood cell that engulfs foreign particles

______n. Process of rendering a patient immune

______o. Less virulent; diluted; weakened

______p. Any substance that brings on the manifestations of an allergy

17. Serum
18. Toxin
19. Toxoid
20. Vaccination
21. Vaccine

2. Complete the following statements concerning body defenses against disease by circling the correct answers.

    a. (Antibodies, Mechanical barriers) are the body's first line of defense.

    b. Trauma can induce an (immune, inflammatory) response.

    c. The immune response leads to the production of (white, red) blood cells.

    d. The inflammatory response depends on (white, red) blood cells that begin phagocytosis.

    e. Barriers to disease include tears, saliva, and (blood, skin).

3. Select from the following list the correct purposes of inflammation by placing an "X" in the appropriate blanks.

______a. To produce energy sources

______b. To produce antibiotics

______c. To produce antibodies

______d. To prevent spread of pathogens

______e. To destroy pathogens

______f. To strengthen the virulence of pathogens

______g. To heal and repair damaged tissue

______h. To localize infection

Written Test

4. List four symptoms of acute inflammatory response.

   a. ____________________

   b. ____________________

   c. ____________________

   d. ____________________

5. Select true statements concerning the treatment of acute inflammation by placing an "X" next to the true statements.

   ______a. Exercise for the inflamed part

   ______b. Application of ice to constrict blood vessels and decrease flow of blood and its white cells and antibodies to the affected part

   ______c. Open drainage to allow bacteria to escape and to relieve tension and swelling of inflamed part

   ______d. Supplement body's natural defenses with specific drugs such as antibiotics

6. Distinguish between the types of immune responses by placing an "X" next to the description(s) of humoral immune response.

   ______a. Involves the production of B cells and some T cells, and then antibodies.

   ______b. Involves the production of T cells (no B cells or antibodies)

7. Select true statements concerning the types of immunity by placing an "X" next to the true statements.

   ______a. Acquired immunity is programmed into one's genetic makeup.

   ______b. Genetic immunity does not involve antibodies.

   ______c. Genetic immunity varies between individuals, nationalities, racial groups, and species.

   ______d. Acquired immunity is always artificially acquired.

Written Test

8. Match types of acquired immunity on the right with the correct descriptions.

______a. Individual is administered a vaccine; body then produces antibodies to the antigen.

______b. Individual contracts disease, and then produces own antibodies to that specific disease and long term memory cells to that disease.

______c. Mother's antibodies pass through placenta to fetus or through breast milk to infant.

______d. Antibodies produced elsewhere are injected in the form of immune serums.

1. Artificially acquired active immunity
2. Artificially acquired passive immunity
3. Naturally acquired active immunity
4. Naturally acquired passive immunity

9. List three types of vaccines.

a. ____

b. ____

c. ____

10. Complete the following statements concerning the allergic response by filling in the blanks with the correct answers.

a. Is basically an ____________________ reaction

b. Is brought on by ____________________ which cause altered reactions in the body tissue of sensitized individuals but which produce no effect in nonsensitized individuals

c. Does not occur on ____________________ contact with potential allergen because antibodies have not yet been produced

d. An example of an allergic reaction is ____________________.

e. Treatment may include avoiding the allergen, desensitization, or use of ____________________.

f. A common inhalant allergen is ____________________.

g. A common food allergen is ____________________.

h. A common drug allergen is to ____________________.

i. A common contactant allergen is ____________________.

Written Test

11. Complete the following statements concerning the characteristics of anaphylaxis by circling the correct answers.

    a. Anaphylaxis is a (mild, severe) allergic reaction to a drug or foreign protein.

    b. Hypersensitive body cells reacting to the drug release histamine or a histamine-like substance, causing vasodilation, hypotension, and (cardiac, bronchiolar) constriction.

    c. Reactions which constitute anaphylactic shock include irritability, (dyspnea, hyperpnea), cyanosis, unconsciousness, and possible convulsions.

    d. Anaphylactic reactions occur within (minutes, hours, days).

    e. Treatment includes (antibiotics, epinephrine).

    f. Serum sickness is an anaphylactic reaction which occasionally follows injection of a (vaccine, serum).

12. Select true statements concerning the rejection syndrome by placing an "X" next to the true statements.

    ______a. Is a type of antigen—antibody reaction

    ______b. Never occurs following transplantation of an organ or tissue

    ______c. Every organism has a natural tendency to accept foreign substances such as tissues from another person or animal so rejection is rare.

    ______d. Tissues or organs to be transplanted are cross-matched in much the same way that blood is matched for transfusion, but matching tissues is more complex than matching blood types.

    ______e. Drugs that suppress antibody formation are used to decrease tissue rejection.

***Permission to duplicate this test is granted.**

Body Defenses Against Disease
Unit 3-D

Unit Evaluation Form

Student Name ________________________ Unit Rating __________

Assignment Sheet 1—Complete a Personal Immunity Survey Rating ______

Comments: ____

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

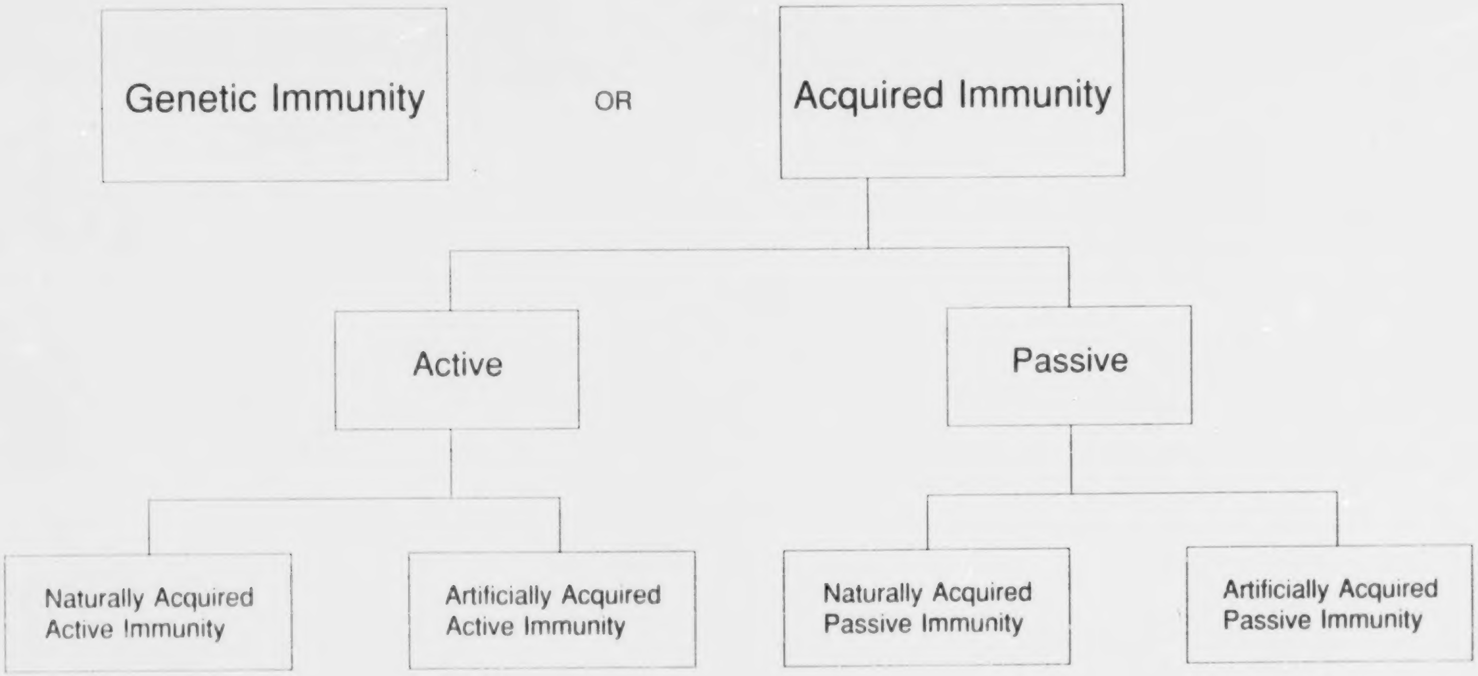
____

Teacher Signature ________________________ Date __________

Student Signature ________________________ Date __________

***Permission to duplicate this form is granted.**

Types of Immunity



Genetic Immunity

OR

Acquired Immunity

Active

Passive

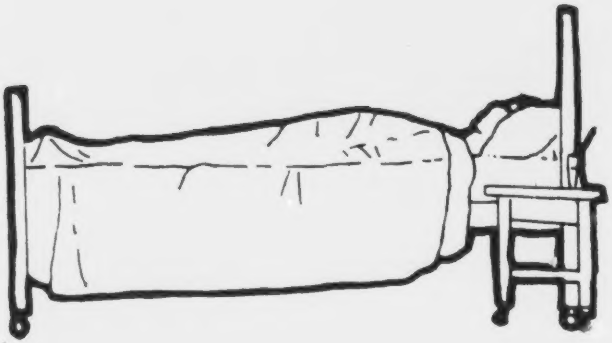
Naturally Acquired Active Immunity

Artificially Acquired Active Immunity

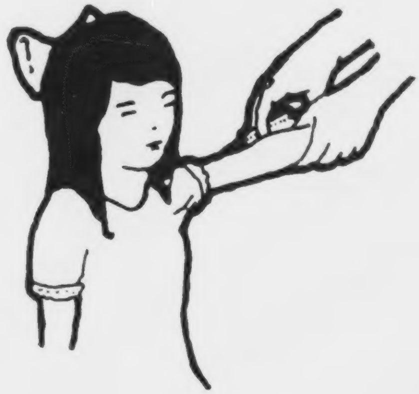
Naturally Acquired Passive Immunity

Artificially Acquired Passive Immunity

Active Immunity

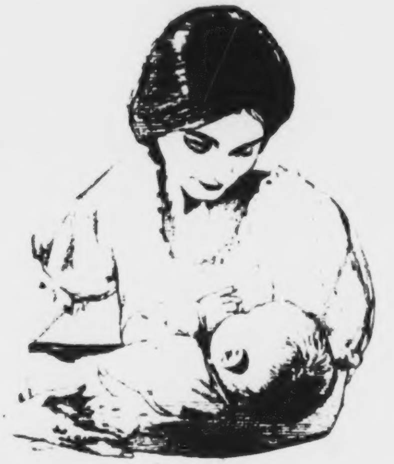


Naturally Acquired Active Immunity—Person contracts disease; manufactures antibodies. Immunity is long-term.

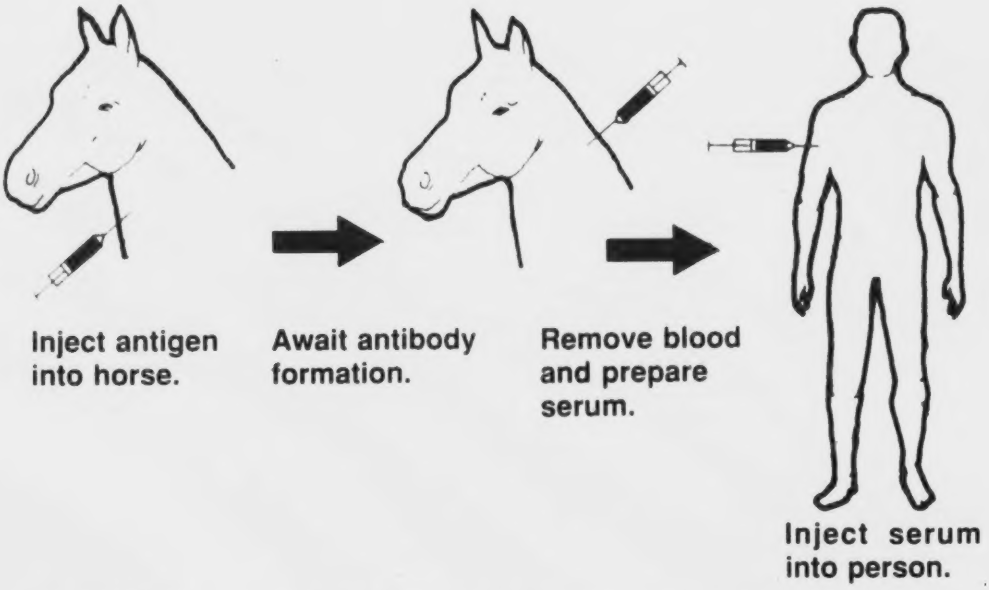


Artificially Acquired Active Immunity—Person is vaccinated; produces own antibodies. Immunity last for months or years.

Passive Immunity



Naturally Acquired Passive Immunity—Mother's antibodies pass to infant. Immunity is short-term.


Inject antigen into horse.
Await antibody formation.
Remove blood and prepare serum.
Inject serum into person.

Artificially Acquired Passive Immunity—Immune serums containing antibodies are injected. Immunity is immediate, but short-term.

Body Defenses Against Disease
Unit 3-D

Information Sheet

1. **Terms and definitions**

   a. **Allergen** — Any substance that brings on the manifestations of an allergy

   b. **Allergy** — Abnormal hypersensitivity by an individual to one or more substances

   c. **Antibody** — Protein substance developed by the body in response to the presence of an antigen that counteracts the antigen

   Note: Antibodies develop a very specific defense to each antigen.

   d. **Antigen** — A substance which induces the formation of antibodies; may be introduced into the body or formed within the body

   Examples: Bacteria, bacterial toxins, foreign blood cells

   Note: The body does not recognize antigens as "belonging" there.

   e. **Antitoxin** — An antibody capable of neutralizing a specific toxin

   f. **Attenuated** — Less virulent; diluted; weakened

   Note: Vaccines that have been made less virulent are called attenuated vaccines.

   g. **Endotoxins** — Bacterial toxins which are liberated only when the bacterial cell is destroyed

   h. **Exotoxins** — Bacterial toxins which diffuse from bacterial cells into surrounding medium

   i. **Immune** — Not susceptible or responsive to a disease or having high degree of resistance to a disease

   j. **Immune response** — The reaction of the body to a foreign substance or substance interpreted as foreign, usually with the production of antibodies

   k. **Immunization** — Process of rendering a patient immune

   Note: Vaccination is only one type of immunization.

   l. **Immunology** — A science that deals with the occurrence and causes of immunity

Information Sheet

m. **Interferon** — An antiviral protein produced by cells infected with a virus and by T cell lymphocytes

Note: Interferon prevents the cells containing the virus from reproducing.

n. **Lymphocytes** — Type of white blood cell that assists in immunity

Note: These include T cells and B cells.

o. **Macrophage** — Type of white blood cell that engulfs foreign particles

p. **Phagocytosis** — The act of a cell engulfing a foreign particle

q. **Serum** — Watery fluid taken from the blood of an animal rendered immune against a pathogenic organism which is injected into a patient to protect against the disease resulting from the pathogenic organism

r. **Toxin** — A poisonous substance

s. **Toxoid** — A toxin treated so as to destroy its toxicity, but still capable of inducing formation of antibodies on injection

t. **Vaccination** — Inoculation with a vaccine

u. **Vaccine** — Suspension of infectious agents given to establish resistance to an infectious disease

Example: Pneumococcal polysaccharide vaccine will protect against *Streptococcus pneumonia* (pneumococcal bacteria).

2. Body defenses against disease

a. Mechanical and chemical barriers

(1) Are the body's first line of defense to prevent invasion of many pathogens

(2) Include intact (unbroken) skin, mucous membranes, gastric secretions, tears, cerumen, saliva, and the normal flora residing in the portals of entry

b. Inflammatory response

(1) Is a local tissue reaction to various cell injuries such as from foreign bodies, chemicals, microorganisms, or trauma

(2) Various white blood cells (granular leukocytes and macrophages) begin phagocytosis to eliminate the noxious agents and damaged tissue.

Information Sheet

c. Immune response

  (1) Is a reaction to an antigen that the body identifies as foreign

  (2) Involves the production of lymphocytes (T cells or B cells) with subsequent antibody formation

Note: The body uses barriers and inflammation against a variety of diseases and foreign impurities. However, the immune response is a body defense against specific agents (antigens).

3. **Purposes of inflammation**

  a. To localize infection

  b. To prevent spread of pathogens

  c. To destroy pathogens

  d. To heal and repair damaged tissue

4. **Symptoms of acute inflammatory response**

  a. Redness

  b. Heat

  c. Swelling

  d. Pain

  e. Disordered (impaired) function

5. **Treatment of acute inflammation**

  a. Rest for the inflamed part

  Note: This is the most important treatment. Exercise or movement of the part not only increases inflammation but helps to spread pathogens.

  b. Application of moderate heat to dilate blood vessels and increase flow of blood and its white cells and antibodies to the affected part

  c. Open drainage to allow bacteria to escape and to relieve tension and swelling of inflamed part

  d. Supplement body's natural defenses with specific drugs such as antibiotics

Information Sheet

6. **Types of immune responses**

   a. **Cell-mediated immune response**

      (1) Involves the production of T cells in response to exposure to an antigen (mainly viral antigens)

      (2) Is a delayed response important in tissue transplant rejection, delayed hypersensitivity, and defense against some infections

      Note: Memory T cells are ready to take action if there is future invasion of the antigen. B cells are not involved in this response. Therefore, no antibodies are formed. Memory T cells take on the responsibility of fighting off future attacks by the antigen.

   b. **Humoral immune response**

      (1) Involves the production of B cells and some T cells in response to exposure to an antigen. The B cells then produce antibodies.

      (2) May produce immunity or hypersensitivity

      Note: Memory B cells stand guard ready to initiate the production of antibodies if the antigen is reintroduced.

7. **Types of immunity**

   a. **Genetic (inborn) immunity**

      (1) Is programmed into one's genetic makeup

      (2) Does not involve antibodies

      (3) Varies between individuals, nationalities, racial groups, and species

      Note: An organism that infects one person may not infect someone from another group.

   b. **Acquired immunity**

      (1) Involves the use of antibodies

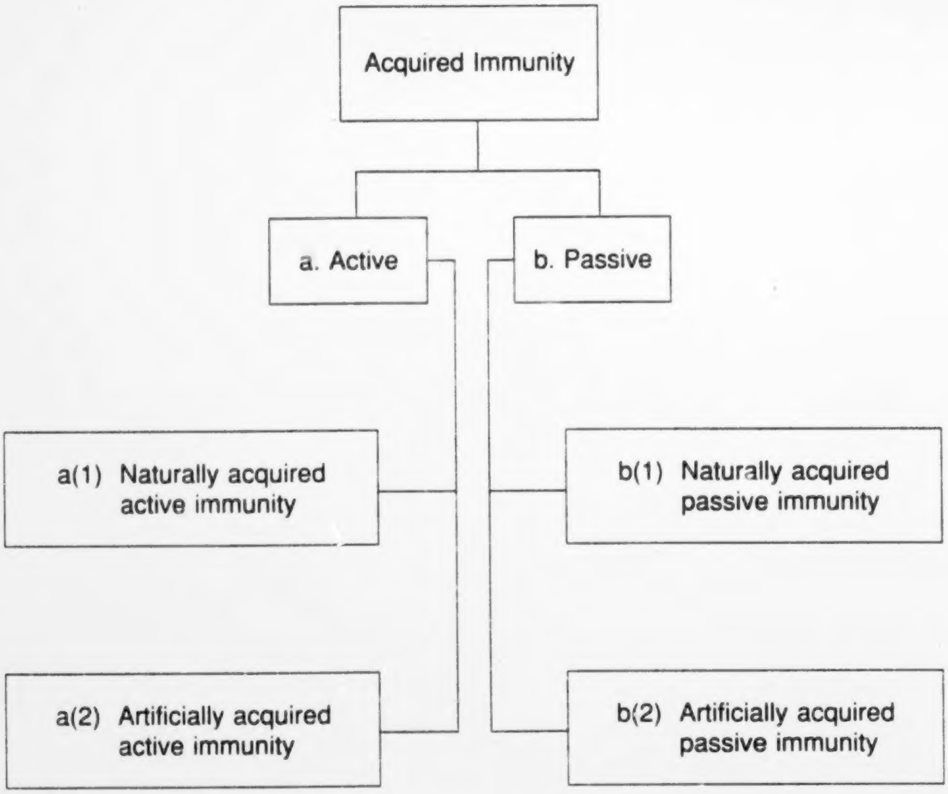
      (2) May be naturally acquired or artificially acquired

      (3) May be active or passive

Information Sheet

8. Types of acquired immunity

Figure 1


Acquired Immunity
a. Active
b. Passive
a(1) Naturally acquired active immunity
a(2) Artificially acquired active immunity
b(1) Naturally acquired passive immunity
b(2) Artificially acquired passive immunity

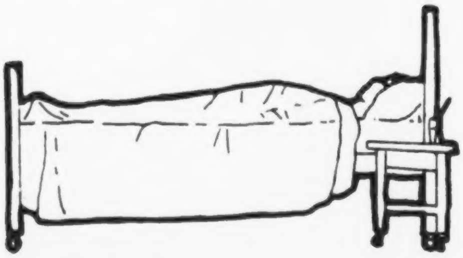
Information Sheet

a. **Active immunity**—Body produces its own antibodies in response to antigens.

(1) **Naturally acquired active immunity**—Individual contracts disease, and then produces own antibodies to that specific disease and long term memory cells to that disease (antigen).

Note: When the individual is exposed to this disease again, the memory cells will quickly produce the needed antibodies to protect the individual who is now immune to that disease.

Figure 2—Naturally acquired active immunity

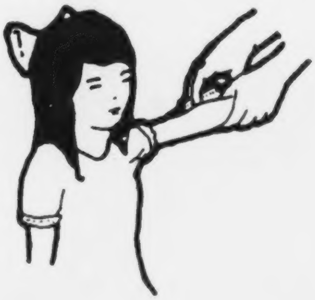


Person contracts disease; manufactures antibodies; immunity is long-term.

(2) **Artificially acquired active immunity**—Individual is administered a vaccine; body then produces antibodies to the antigen.

Note: Although active immunity produces long-term immunity, it may not last a lifetime. Booster shots may be required to maintain a high enough level of antibodies to prevent the disease.

Figure 3—Artificially acquired active immunity



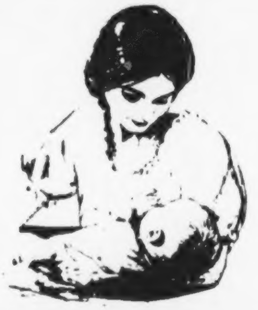
Person is vaccinated; produces own antibodies. Immunity lasts for months or years.

Information Sheet

b. **Passive immunity**—Antibodies from an outside source are introduced into the body; body does not have to produce its own antibodies.

(1) **Naturally acquired passive immunity**—Mother's antibodies pass through placenta to fetus or through breast milk to infant.

Figure 4—Naturally acquired passive immunity



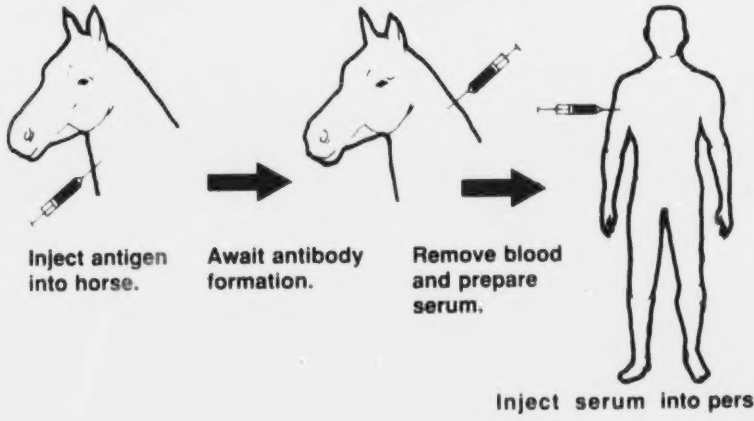
Mother's antibodies pass to infant.

(2) **Artificially acquired passive immunity**—Antibodies produced elsewhere are injected in the form of immune serums.

Note: Immune serums may be prepared in animals (such as horses), other humans, or in the laboratory. Immune serums (antiserums) only provide short-term immunity with no memory against future invasions. These are not like vaccines which give long-term immunity.

Examples: Immune globulin (gamma globulin) contains special antibodies and is commonly given to boost immunity when individuals have been exposed to Hepatitis A virus. Snake antivenin is a passive antiserum containing antitoxin to snake venom and is given to snake-bite victims.

Figure 5—Artificially acquired passive immunity


Inject antigen into horse.
Await antibody formation.
Remove blood and prepare serum.
Inject serum into person.

Information Sheet

9. Types of vaccines

a. Those containing living, attenuated pathogens

Examples: Live oral polio vaccine and live attenuated measles vaccine

b. Those containing killed (inactivated) pathogens

Examples: Vaccines for rabies, influenza, pertussis (whopping cough), and typhoid fever

c. Those containing soluble toxins or toxoids of pathogens

Examples: Vaccines for diphtheria and tetanus

d. Those containing extracts of pathogens (such as a bacterial capsule)

Examples: Pneumococcal polysaccharide vaccine and *Haemophilus* b conjugate vaccine

10. Allergic response

a. Is basically an antigen—antibody reaction

b. Is brought on by allergens which cause altered reactions in the body tissue of sensitized individuals but which produce no effect in nonsensitized (nonallergic) individuals

c. Does not occur on first contact with potential allergen because antibodies have not yet been produced. An allergic response may occur the second time a person is exposed to the allergen or may not occur for years until repeated exposures have produced enough antibodies to trigger the response.

d. Allergic reactions can range from itching, redness of skin, and headache to breathing difficulties and anaphylaxis.

e. Treatment may include avoiding the allergen, desensitization, or use of antihistamines.

f. Common allergens include

(1) Inhalants such as dust, pollen, and perfume

(2) Foods such as wheat, eggs, milk, chocolate, and strawberries

(3) Drugs such as aspirin and various antibiotics and serums

(4) Other contactants such as animals, plants, hair, and fur

Information Sheet

11. Characteristics of anaphylaxis

a. Is a **severe** allergic reaction to a drug such as penicillin or a foreign protein such as insect venom

b. Hypersensitive body cells reacting to the drug release histamine or a histamine-like substance, causing vasodilation, hypotension, and bronchiolar constriction.

c. Reactions which constitute anaphylactic shock include

   (1) Irritability

   (2) Dyspnea

   (3) Cyanosis

   (4) Unconsciousness

   (5) Convulsions and possibly death

d. Anaphylactic reactions occur **suddenly**, within minutes.

e. Reactions vary but in extreme cases death may occur if emergency treatment is not given.

Note: Death usually results from the spasm of muscles of the bronchioles.

f. Treatment includes vasopressor agents, especially epinephrine, as well as antihistamines, corticosteriods, and oxygen by positive pressure.

g. Serum sickness is an anaphylactic reaction which occasionally follows injection of foreign serums, especially horse serums.

h. Individuals with severe allergies and prior anaphylactic reactions should always wear medical alert tags.

12. Rejection syndrome

a. Is a type of antigen—antibody reaction

b. May occur following transplantation of an organ or tissue

c. Every organism has a natural tendency to reject foreign substances, especially tissues from another person or animal.

Information Sheet

d. Tissues or organs to be transplanted are cross-matched in much the same way that blood is matched for transfusion, but matching tissues is more complex than matching blood types.

e. Drugs that suppress antibody formation are used to decrease tissue rejection.

Body Defenses Against Disease
Unit 3-D

Student Supplement 1—Review Body Defenses Against Disease

Name ______________________________ Date ______________

Directions: Read the following statements and select the best answer that completes the statement. Circle the correct letter or place the letter in the blank provided.

_____ 1. All of the following are symptoms of an acute inflammatory response **EXCEPT**

a. Redness
b. Heat
c. Infection
d. Swelling

_____ 2. When a mother's antibodies are passed through the placenta to the fetus, it is an example of

a. Genetic immunity
b. Inborn immunity
c. Naturally acquired passive immunity
d. Naturally acquired active immunity

_____ 3. The rabies vaccine is made from

a. Living pathogens
b. Killed pathogens
c. Toxoids of pathogens
d. Extracts of pathogens

_____ 4. A severe allergic reaction to penicillin is called

a. Toxic syndrome
b. Serum sickness
c. Rejection syndrome
d. Anaphylaxis

_____ 5. When an immune serum containing antibodies is given to an individual, it is an example of

a. Naturally acquired active immunity
b. Artificially acquired active immunity
c. Naturally acquired passive immunity
d. Artificially acquired passive immunity

Student Supplement 1

______ 6. Any substance that brings on the manifestations of an allergy is a/an

a. Allergen
b. Antigen
c. Toxin
d. Toxoid

______ 7. When the body produces its own antibodies in response to antigens, it is called __________________ immunity.

a. Genetic
b. Active
c. Passive
d. Acquired

______ 8. Vaccines containing weakened pathogens are called

a. Virulent
b. Inactive
c. Serums
d. Attenuated

______ 9. Immunity that lasts the longest time results from

a. Contracting disease and producing own antibodies
b. Receiving vaccine and producing own antibodies
c. Receiving antibodies from mother
d. Receiving antibodies from immune serums

______10. If you are exposed to Hepatitis A, you may require ____________ to boost your immunity.

a. Vaccine for Hepatitis A
b. Antibiotics
c. Vitamin C
d. Immune globulin

______11. All of the following are mechanical and chemical barriers against disease **EXCEPT**

a. Normal flora
b. Tears
c. Antibodies
d. Skin

Student Supplement 1

_______12. When an individual is given a vaccine and then produces his/her own antibodies, it is an example of

a. Naturally acquired active immunity
b. Artificially acquired active immunity
c. Naturally acquired passive immunity
d. Artificially acquired passive immunity

_______13. T cells and B cells are

a. Red blood cells involved in phagocytosis
b. White blood cells involved in the immune response
c. White blood cells given as vaccines
d. All of the above

_______14. Antigens induce the formation of

a. Antibodies
b. Infection
c. Toxins
d. Rashes

_______15. Vaccines may be produced from

a. Living or killed pathogens
b. Toxoids of pathogens
c. Extracts of pathogens
d. All of the above

_______16. When an individual contracts a disease and forms antibodies to the disease, it is an example of

a. Naturally acquired active immunity
b. Artificially acquired active immunity
c. Naturally acquired passive immunity
d. Artificially acquired passive immunity

_______17. Genetic immunity varies between

a. Nationalities
b. Racial groups
c. Species
d. All of the above

Student Supplement 1

______18. The best treatment for inflammation is

a. Application of heat
b. Antibiotics
c. Drainage of area
d. Rest of inflamed part

______19. In which type of immune response are B cells and antibodies formed?

a. Latent
b. Humoral
c. Cell-mediated
d. Genetic

______20. All of the following are purposes of inflammation **EXCEPT**

a. To produce antibodies
b. To localize infection
c. To destroy pathogens
d. To heal and repair damaged tissue

Body Defenses Against Disease
Unit 3-D

Assignment Sheet 1—Complete a Personal Immunity Survey

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Vaccinations are correctly recorded	______
Allergies are correctly recorded	______

Directions: Complete the following survey indicating the vaccinations you have received and any allergies you may have.

1. Indicate which of the following vaccinations you have received and when you received them.

	VACCINATION	YES	NO	DATE
a.	Smallpox	Y	N	____________
b.	Measles	Y	N	____________
c.	Mumps	Y	N	____________
d.	Rubella	Y	N	____________
e.	Diphtheria	Y	N	____________
f.	Pertussis (whopping cough)	Y	N	____________
g.	Tetanus	Y	N	____________
h.	Polio	Y	N	____________
i.	Influenza	Y	N	____________
j.	Hepatitis B	Y	N	____________
k.	Pneumococcal polysaccharide	Y	N	____________
l.	*Haemophilus* b conjugate (HIB)	Y	N	____________
m.	Cholera	Y	N	____________
n.	Typhoid	Y	N	____________

Assignment Sheet 1

DATE

2. Have you ever had chicken pox? Y N ______________________

3. Have you been tested for tuberculosis? Y N ______________________

4. Indicate which, if any, of the following items you are allergic to, and describe specifically the item.

   Y N Dust, pollen ______________________

   Y N Foods ______________________

   Y N Drugs, medicines ______________________

   Y N Animals, plants ______________________

5. Have you ever had a **severe** (life-threatening) allergic reaction? Y N Describe the cause and what was done to treat the reaction.

6. Has anyone in your family ever had a severe allergic reaction? Y N Explain.

Wound Healing
Unit 4-D

Objective Sheet

Unit Objective

After completing this unit, the student should be able to distinguish among types of wound healing, match types of wounds with their descriptions, and select factors affecting wound healing. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the students should be able to:

1. Match terms related to wound healing with their correct definitions.
2. Distinguish among types of wound healing.
3. Complete statements concerning the phases of first intention wound healing.
4. Distinguish among the basic types of wounds.
5. Match classes of traumatic wounds with their correct descriptions.
6. Identify types of traumatic wounds.
7. Match classifications of surgical wounds with their correct descriptions.
8. Select factors influencing wound healing.
9. Select true statements concerning factors making up the physical condition of a patient and their effect on healing.
10. Complete statements concerning the effects of operative technique on healing.
11. Distinguish among types of wound disruption.
12. Complete statements concerning characteristics of wound disruption.
13. Classify surgical and traumatic wounds. (Assignment Sheet 1)
14. Determine types of traumatic wounds. (Assignment Sheet 2)
15. Distinguish between positive and negative effects on wound healing. (Assignment Sheet 3)

Wound Healing
Unit 4-D

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Types of Wound Healing (Objective 2)
   TM 2 and 3—Types of Traumatic Wounds (Objective 6)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the student supplement. This could be used as a homework assignment, practice exercise, or quiz. Explain to students how you plan to evaluate the supplement, if at all.

12. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Record assignment sheet ratings and written test scores on the Unit Evaluation Form. Add any additional assignments or supplemental activities that should be part of the unit evaluation.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Discuss Student Supplement 1. You may want to divide the class into groups for discussion. This reinforces the unit content, **foundation skills**, and **group effectiveness skills**.

2. Divide the class into groups and assign each a type of traumatic wound and have them discuss examples of their assigned type. Each group should present their examples to the class. This reinforces the unit content through **group effectiveness** and **communication skills**.

3. Divide the class into four groups. Assign each group one of the classifications of surgical wounds. Pass out a list of surgical procedures and have each group decide which procedures fit into their assigned classification. They should be ready to explain their decisions. Have each group report their decisions and rationale. This reinforces unit content, **communication, group effectiveness**, and **critical thinking skills**.

4. You may want to correlate this unit with first aid and teach basic first aid techniques at this time. Contact your local Red Cross for assistance.

Suggested Activities

Resources Used in Developing This Unit

1. American Red Cross. *American Red Cross Standard Workbook: First Aid*. 1991.
2. Association of Surgical Technologists, Inc. *Core Curriculum for Surgical Technology*, 3rd ed., 1990.
3. Atkinson, Lucy Jo. *Berry & Kohn's Operating Room Technique*, 7th ed. St. Louis: C. V. Mosby, 1992.
4. Burton, Gwendolyn. *Microbiology for the Health Sciences*, 4th ed. Philadelphia: J. B. Lippincott Company, 1992.
5. Fong, Elizabeth. *Microbiology for Health Careers*, 4th ed. Albany, NY: Delmar Publishers, 1987.
6. *Frobisher and Fuerst's Microbiology in Health and Disease*, 15th ed. revised by Robert Fuerst. Philadelphia: W. B. Saunders Co., 1983.
7. Gruendemann, Barbara and Margaret Huth Meeker. *Alexander's Care of the Patient in Surgery*, 9th ed. St. Louis: C. V. Mosby Co., 1991.
8. Smith, Alice Lorraine. *Microbiology and Pathology*, 10th ed. St. Louis: C. V. Mosby Co., 1985.

Suggested Supplemental Resources

1. Obtain a current copy of the Communicable Diseases Center's "Guidelines for Prevention of Surgical Wound Infection" (order #PB85923403) which also discusses the classes of surgical wounds. This is sold through the following agency:

   National Technical Information Services
   U.S. Department of Commerce
   5285 Port Royal Road
   Springfield, VA 22161
   703-847-4600

2. Contact Davis & Geck, Pearl River, NY 10965 for videos or printed materials on wound healing, or check with their local sales representative.
3. Contact Ethicon, Inc. Somerville, NJ 08876 for videos or printed materials on wound healing, or check with their local sales representative.

Wound Healing
Unit 4-D

Answers to Student Supplement 1

a. Ischemia
b. Contaminated
c. Hematoma
d. Open
e. Maturation
f. Sinus
g. Disruption
h. Granulation tissue
i. Avulsion
j. Second
k. Puncture
l. Cicatrix
m. Aseptic technique
n. Fibrinogen
o. Perforation
p. Sero-sanguinous
q. Third intention
r. Trauma
s. Abrasion
t. Lag
u. Laceration
v. Collagen
w. Closed
x. Chronic
y. Hemostasis
z. Incised
aa. Evisceration
bb. Contusion
cc. Necrosis
dd. Dehiscence
ee. Keloid
ff. Debridement
gg. Clean

Wound Healing
Unit 4-D

Answers to Assignment Sheets

Assignment Sheet 1

a. Dirty and infected
b. Clean-contaminated
c. Dirty and infected
d. Clean
e. Contaminated
f. Complicated, contaminated
g. Simple, contaminated
h. Simple, clean
i. Complicated, contaminated
j. Complicated, contaminated

Assignment Sheet 2

a. Perforation
b. Crushed
c. Avulsion, partial
d. Puncture
e. Incised
f. Laceration
g. Abrasion
h. Contusion

Assignment Sheet 3

a. N
b. N
c. P
d. P
e. P
f. N
g. N
h. P
i. P
j. N
k. N
l. N
m. P
n. N
o. P
p. N
q. P
r. P
s. P
t. N
u. P
v. N
w. N
x. P
y. N
z. P

Wound Healing
Unit 4-D

Answers to Written Test

1.
   - a. 7
   - b. 17
   - c. 4
   - d. 8
   - e. 6
   - f. 3
   - g. 12
   - h. 9
   - i. 2
   - j. 10
   - k. 5
   - l. 15
   - m. 1
   - n. 11
   - o. 13

2.
   - a. 3rd
   - b. 2nd
   - c. 1st
   - d. 2nd or 3rd
   - e. 2nd or 3rd
   - f. 2nd
   - g. 2nd
   - h. 3rd
   - i. 1st
   - j. 2nd or 3rd
   - k. 1st

3.
   - a. 1
   - b. 3
   - c. 3
   - d. 2
   - e. 1
   - f. 2

4.
   - a. T
   - b. C
   - c. S
   - d. S
   - e. C

5.
   - a. 2
   - b. 1
   - c. 5
   - d. 3

6.
   - a. Puncture
   - b. Avulsion, complete
   - c. Incised
   - d. Abrasion

7.
   - a. 3
   - b. 1
   - c. 2
   - d. 4

8. a, c, d

9. b, c, f, g, h

Answers to Written Test

10. a. 4
    b. 3
    c. 2
    d. 1
    e. 4

11. b

12. a. Small
    b. 4th and 6th
    c. Sero-sanguinous
    d. Nutritional

Wound Healing
Unit 4-D

Written Test

Name ______________________________ Score ______________

1. Match the terms on the right with the correct definitions.

______a. Formation of new tissue, composed largely of newly growing capillaries which form in types of wounds left open

______b. Injury to body tissue produced by violence or any chemical, thermal, or other extrinsic agent

______c. Removal of foreign material; cutting away all dead and devitalized tissues leaving an open, clean wound where anaerobic organisms cannot survive

______d. Fibrous connective tissue containing blood vessels and lymphatics; not visible in first intention healing

______e. Constituent of blood that aids in coagulation

______f. White protein contained in connective tissues and bones

______g. Dense, unsightly connective tissue or excessive scar formation that is often removed surgically

______h. Tumor or swelling which contains blood

______i. Scar left by a healed wound

______j. Control of bleeding

______k. When the orderly closure of a wound is altered; usually suture lines break down, decreasing support of abdominal wall over peritoneal contents

1. Adhesion
2. Cicatrix
3. Collagen
4. Debridement
5. Disruption
6. Fibrinogen
7. Granulation
8. Granulation tissue
9. Hematoma
10. Hemostasis
11. Ischemia
12. Keloid
13. Necrosis
14. Proud flesh
15. Sero-sanguinous
16. Sinus
17. Trauma

Written Test

_______l. Blood-tinged or colored serous drainage

_______m. Union of two surfaces or structures that normally are separate

_______n. Decrease of blood supply to the tissue

_______o. Death of tissue cells

2. Distinguish among the types of wound healing by placing a "1st" next to the descriptions of healing by first intention, a "2nd" for second intention, and a "3rd" for third intention in the blanks provided.

Note: Some descriptions may have more than one answer.

_______a. When a sutured wound becomes very infected after surgery, the primary sutures are removed and secondary sutures are put in later after infection subsides.

_______b. Granulation tissue forms in the gap of the wound and closes it by contraction.

_______c. Healing is by primary union.

_______d. Scar formation is excessive.

_______e. Healing may produce a weak union, which may be conducive to incisional herniation later.

_______f. Wound is not closed (sutured).

_______g. Healing is by process of granulation from the bottom up.

_______h. Similar to second intention healing except wound is sutured, either delayed or secondary.

_______i. Has no separation of wound edges and minimal scar information ("hair line" scar).

_______j. Healing takes longer than first intention.

_______k. Has no postoperative swelling, serous discharge, or local infection.

Written Test

3. Complete the following statements concerning the phases of first intention wound healing by circling the correct answers or numbers.

   a. The ______ phase occurs between days 1 - 6 of healing.

      (1) Lag (substrate)
      (2) Healing (proliferative)
      (3) Maturation (remodeling)

   b. During the ______ phase collagen density increases, vascularity decreases, and the scar grows pale.

      (1) Lag
      (2) Healing
      (3) Maturation

   c. The ______ phase occurs between days 14 and 21 of healing.

      (1) Lag
      (2) Healing
      (3) Maturation

   d. During the ______ phase new cells are formed and tensile strength grows rapidly because of collagen.

      (1) Lag
      (2) Healing
      (3) Maturation

   e. During the ______ phase exudate loosely binds the cut edges together with a scab and leukocytes remove bacteria and damaged tissue.

      (1) Lag
      (2) Healing
      (3) Maturation

   f. The ______ phase occurs between days 6 - 14 of healing.

      (1) Lag
      (2) Healing
      (3) Maturation

Written Test

4. Distinguish among the basic types of wounds by placing the following letters next to the correct descriptions:

C — Chronic wound
S — Surgical incision
T — Traumatic injury

______a. Caused by chemical, thermal, or other extrinsic factors

______b. Caused by intrinsic factors, such as poor circulation

______c. Caused by a purposeful cut through intact skin

______d. Involves the use of aseptic technique

______e. Results in a wound that will not heal by 2nd intention

5. Match classes of traumatic wounds on the right with the correct descriptions.

______a. The skin is broken, and the object and/or condition surrounding the injury were relatively clean

______b. The skin is intact, but the underlying tissue is injured

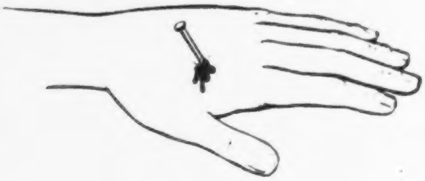
______c. The skin is broken, but the underlying tissue is not injured

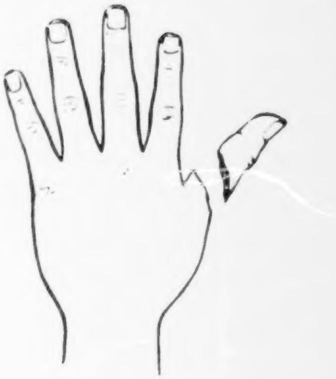
______d. The skin and underlying tissues are injured or destroyed by crushing, burning, or implantation of a foreign object

1. Closed
2. Open, clean
3. Open, complicated
4. Open, contaminated
5. Open, simple

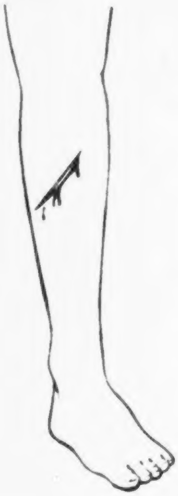
Written Test

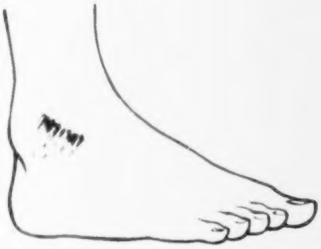
6. Identify the following types of traumatic wounds.





a. ______________________________ b. ______________________________





c. ______________________________ d. ______________________________

Written Test

7. Match the classifications of surgical wounds on the right with their correct descriptions.

______a.
  (1) Open fresh traumatic wound of less than four hours old
  (2) Major break in aseptic technique occurred
  (3) Acute, nonpurulent inflammation present
  (4) Gross spillage/contamination from gastrointestinal tract
  (5) Entry into biliary or genitourinary tracts with infected bile or urine present

______b.
  (1) Elective procedure: wound made under ideal conditions
  (2) Primary closure, no drain
  (3) No breaks in aseptic technique
  (4) No inflammation present
  (5) Alimentary, genitourinary, or respiratory tracts or oropharyngeal cavity not entered

______c.
  (1) Primary closure, wound drained
  (2) Minor breaks in aseptic technique occurred
  (3) No inflammation present
  (4) Alimentary, genitourinary, or respiratory tract, or oropharyngeal cavity entered under controlled conditions — without unusual contamination or spillage

______d.
  (1) Old traumatic wound of over four hours old from a dirty source or the presence of necrotic tissue, foreign body, or fecal material
  (2) Microbial contamination is present in the operative field before the procedure
  (3) Acute bacterial inflammation is present; may be purulent or there is a known clinical infection
  (4) Presence of a perforated organ such as a bowel

1. Clean
2. Clean-contaminated
3. Contaminated
4. Dirty and infected

Written Test

8. Select from the following list the correct factors influencing wound healing by placing an "X" in the appropriate blanks.

______a. Operative technique

______b. Length of hospital stay

______c. Type of wound

______d. Physical condition of patient

______e. Mental condition of patient

9. Select true statements concerning factors making up the physical condition of a patient and their effect on healing by placing an "X" next to the true statements.

______a. Skin tone and muscle tone increase (improve) with age.

______b. Excess fat causes difficulty in confining and securing good closure, and is the most vulnerable of all tissues to trauma and infection.

______c. Wound healing is impaired by deficiencies in zinc, protein, carbohydrates, and vitamins A, B, and C.

______d. Radiation in large doses preoperatively speeds tissue healing.

______e. Since wound healing is basically collagen synthesis, steroids have a positive effect on the healing process.

______f. Abnormalities in immune responses such as allergic reactions can contribute to delayed wound healing.

______g. Edema, vomiting, or coughing can place stress on the healing wound before fibroplasia takes place.

______h. Associated diseases such as diabetes, anemia, cirrhosis, and leukemia can delay the wound-healing process.

Written Test

10. Complete the following statements concerning the effects of operative technique on healing by circling the correct answer or letter.

    a. Which of the following best describes the effects of aseptic technique on wound healing?

        (1) Aseptic technique is important on the part of the surgeon.
        (2) Aseptic technique has minimal effect on wound healing.
        (3) Aseptic technique applies to tissue approximation and tissue handling to some extent.
        (4) Aseptic technique must by followed by all of the operating room team to promote healing and prevent infection.

    b. ______ must be achieved to prevent loss of the patient's blood and to provide conditions for accurate dissection.

        (1) Homostasis
        (2) Hetrostasis
        (3) Hemostasis
        (4) Hemeostasis

    c. All of the following are true about tissue handling EXCEPT:

        (1) All tissues should be handled as gently as possible.
        (2) Incisions should be extended as long as possible to enhance exposure.
        (3) Retractors are placed to provide exposure but without causing pressure on organs.
        (4) Careful consideration is given to underlying blood vessels and nerves.

    d. All the following are true about tissue approximation EXCEPT:

        (1) Precision is used to create a dead space to promote healing.
        (2) Closure that is too tight will cause ischemia.
        (3) Wound edges not closely approximated may delay healing.
        (4) Serum or blood that collects in a dead space may delay healing.

    e. All of the following are true about wound closure EXCEPT:

        (1) Suture materials provide all of the strength of the wound immediately after closure.
        (2) Closely spaced sutures give a stronger suture line.
        (3) To minimize tissue reaction, the least amount and smallest size suture consistent with the holding power of the tissue is used.
        (4) Drainage tubes strengthen a wound and should be placed in the center of the wound.

Written Test

11. Distinguish among types of wound disruption by placing an "X" next to the description of evisceration.

_______a. Separation of the layers of a surgical wound

_______b. Extrusion of internal organs or viscera resulting from wound dehiscence

_______c. Partial protrusion of the abdominal contents through an opening in the abdominal wall

12. Complete the following statements concerning characteristics of wound disruption by circling the correct answers.

a. May occur in a (small, large) percentage of clean surgical abdominal wounds

b. Usually happens between (1st and 2nd, 3rd and 4th, 4th and 6th) postoperative day

c. One symptom may be a profuse amount of (clear, sero-sanguinous) drainage on abdominal dressing.

d. Possible causes include infection, type and direction of incision, and (emotional, nutritional) status of patient.

***Permission to duplicate this test is granted.**

Wound Healing
Unit 4-D

Unit Evaluation Form

Student Name ______________________ Unit Rating __________

Assignment Sheet 1—Classify Surgical and Traumatic Wounds Rating ______

Comments: ______________________

____

Assignment Sheet 2—Determine Types of Traumatic Wounds Rating ______

Comments: ______________________

____

Assignment Sheet 3—Distinguish Between Positive and Negative Effects on Wound Healing Rating ______

Comments: ______________________

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ______________________

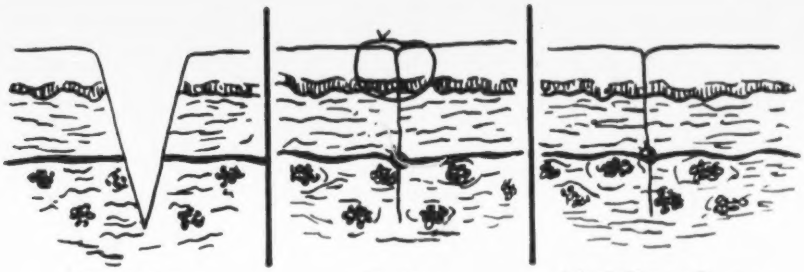
____

Teacher Signature ______________________ Date __________

Student Signature ______________________ Date __________

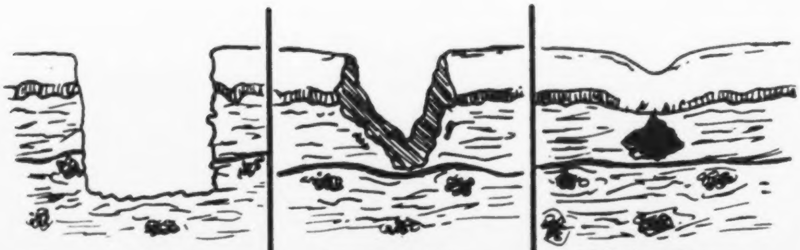
*Permission to duplicate this form is granted.

Types of Wound Healing



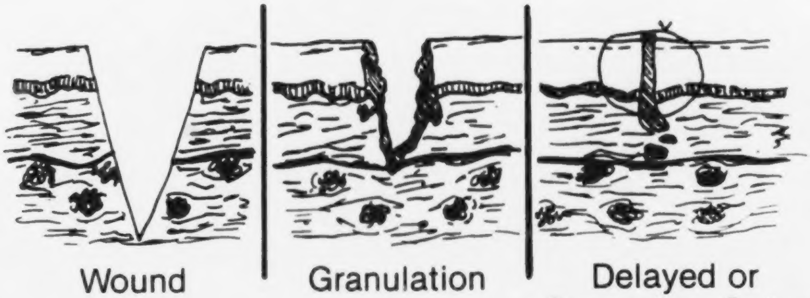
Incision Suture Hairline Scar

First Intention



Gaping Wound Granulation Wide Scar

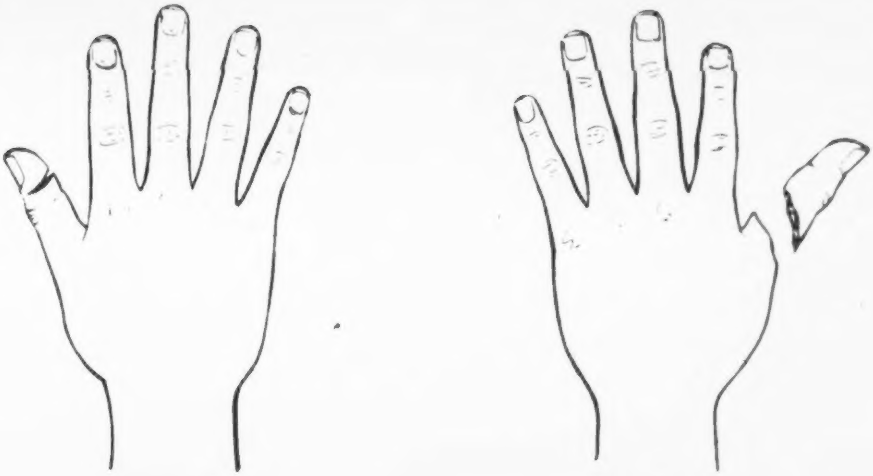
Second Intention



Wound Granulation Delayed or Secondary Suture

Third Intention

Types of Traumatic Wounds



Partial

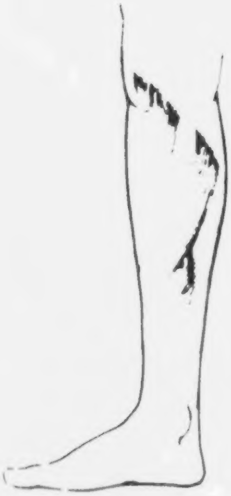
Complete

Avulsion

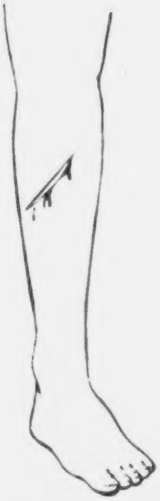
Abrasion

Contusion

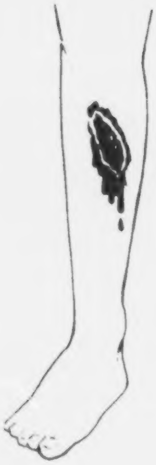
Types of Traumatic Wounds (Continued)



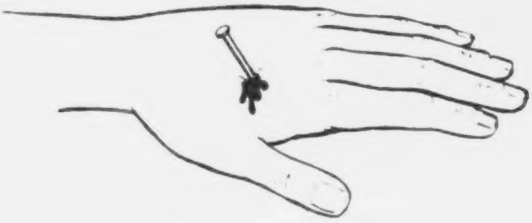
Crushed



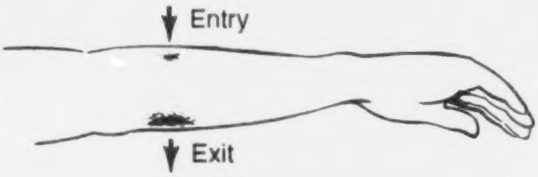
Incised



Laceration



Puncture



Perforation

Wound Healing
Unit 4-D

Information Sheet

1. **Terms and definitions**

    a. **Adhesion** — Union of two surfaces or structures that normally are separate

    b. **Cicatrix** — Scar left by a healed wound

    c. **Collagen** — White protein contained in connective tissues and bones

    d. **Debridement** — Removal of foreign material; cutting away all dead and devitalized tissues leaving an open, clean wound where anaerobic organisms cannot survive

    e. **Disruption** — When the orderly closure of a wound is altered; usually suture lines break down, decreasing support of abdominal wall over peritoneal contents

    f. **Fibrinogen** — Constituent of blood that aids in coagulation

    g. **Granulation** — Formation of new tissue, composed largely of newly growing capillaries which form in types of wounds left open

    h. **Granulation tissue** — Fibrous connective tissue containing blood vessels and lymphatics; not visible in first intention healing

    i. **Hematoma** — Tumor or swelling which contains blood (usually clotted)

    j. **Hemostasis** — Control of bleeding

    k. **Ischemia** — Decrease of blood supply to the tissue

    l. **Keloid** — Dense, unsightly connective tissue or excessive scar formation that is often removed surgically

    m. **Necrosis** — Death of tissue cells

    n. **Proud flesh** — Overgrowth of granulation tissue

    o. **Sero-sanguinous** — Blood-tinged or colored serous drainage

    p. **Sinus** — Canal or passage leading to an abscess

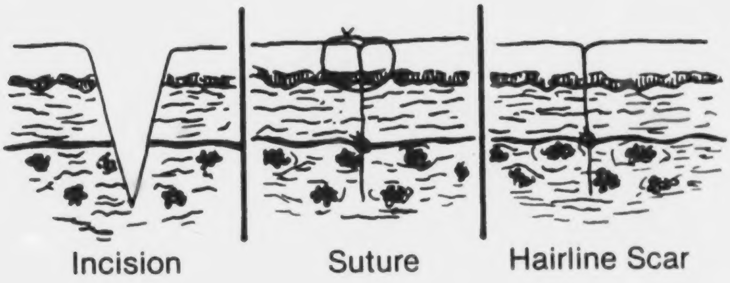
    q. **Trauma** — Injury to body tissue produced by violence or any chemical, thermal, or other extrinsic agent

Information Sheet

2. Types of wound healing

a. Healing by first intention

Figure 1


Incision
Suture
Hairline Scar

(1) Has no postoperative swelling.

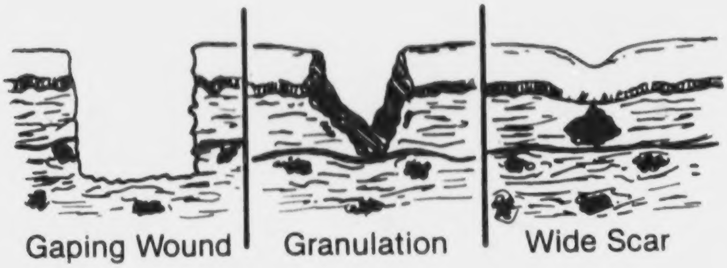
(2) Has no serous discharge or local infection.

(3) Has no separation of wound edges and minimal scar information ("hair line" scar).

(4) Healing is by primary union.

b. Healing by second intention

Figure 2


Gaping Wound
Granulation
Wide Scar

(1) Infection, excessive trauma, loss of tissue, or poorly approximated tissue is present.

(2) Healing is by process of granulation from the bottom up.

(3) Wound is **NOT** closed (sutured).

(4) Granulation tissue forms in the gap of the wound and closes it by contraction.

Information Sheet

(5) Healing takes longer than first intention (because more area must be filled in).

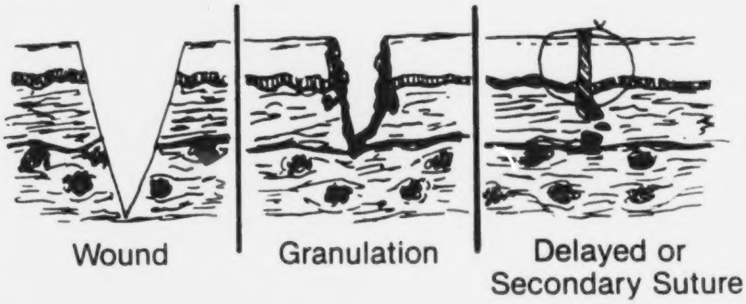
(6) Scar formation is excessive.

(7) Healing may produce a weak union, which may be conducive to incisional herniation (rupture) later.

(8) Risk of a secondary infection is proportional to amount of necrotic tissue present.

c. Healing by third intention

Figure 3



(1) Similar to second intention healing except wound is sutured, either delayed or secondary.

  (a) When wound is infected at time of surgery, suturing is delayed until infection subsides.

  Example: Debridement of third degree burn

  (b) When a sutured wound becomes very infected after surgery, the primary sutures are removed and secondary sutures are put in later after infection subsides.

  (c) During this period of waiting for infection to subside, wound has begun to heal by granulation, and now the two surfaces of granulation tissue are brought together by the delayed or secondary sutures.

(2) Healing takes longer than first intention.

(3) A deeper and wider scar usually results.

(4) Healing may produce a weak union, which may be conducive to incisional herniation later.

Information Sheet

3. **Phases of first intention wound healing (no infection)**

   a. Lag (substrate) phase (days 1-6)

      (1) Exudate containing blood, lymph, and fibrin begins clotting and loosely binds the cut edges together.

      (2) Fibrin, clotting blood, and serum protein dry out, forming a scab which seals the wound.

      (3) Leukocytes remove bacteria and damaged tissue debris.

   b. Healing (proliferative) phase (days 6-14)

      (1) Fibroblasts multiply rapidly bridging wound edges, and secrete collagen which forms fibers.

      (2) Tensile strength grows rapidly because of collagen.

      (3) New cells are formed.

   c. Maturation (remodeling) phase (days 14-21)

      (1) Scar forms.

      (2) Collagen reforms into cross-links which increase tensile strength.

      (3) As collagen density increases, vascularity decreases and the scar grows pale.

4. **Types of wounds**

   a. **Chronic wounds** — Wounds that will not heal by 2nd intention and may be caused by extrinsic or intrinsic factors

      Examples: Ulcerations, pressure sores, sinus tracts

   b. **Traumatic injuries** — When a chemical, thermal, or other extrinsic agent has injured living body tissue

   c. **Surgical incisions** — When a surgeon cuts through intact tissue using aseptic technique

Information Sheet

5. **Classes of traumatic wounds**

   a. **Closed wounds** — The skin is intact, but the underlying tissue is injured

   Examples: Simple fractures, torn ligaments, blister

   b. **Open wounds** — The skin is broken.

   Examples: Abrasions, lacerations, penetrations

   (1) **Simple** — The skin is interrupted but without loss or destruction of underlying tissue

   Example: Lacerations

   (2) **Complicated** — The skin and underlying tissues are injured or destroyed by crushing, burning, or implantation of a foreign object.

   Example: Bullet or sharp object that is still present

   (3) **Clean** — The object and/or conditions surrounding the injury were relatively clean. The wound is cared for within six hours after it occurs. Will heal by 1st intention.

   Example: Cut occurs when unloading dishwasher

   (4) **Contaminated** — The conditions and/or object surrounding the injury are obviously not clean; or if the wound is over six hours old. Will heal by 2nd or 3rd intention.

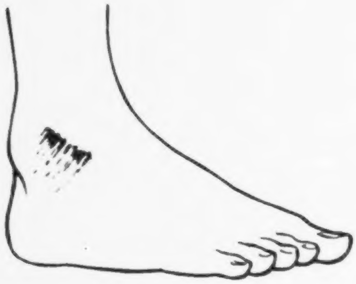
   Example: Cut occurs in a livestock holding pen

Information Sheet

6. Types of traumatic wounds

a. **Abrasion** — A wound caused by mechanical irritation such as boot rubbing, scraping, or being injured with sandpaper.

Figure 4



b. **Avulsion** — A portion of the skin and soft tissue is partially or completely torn away.

Figure 5—Partial

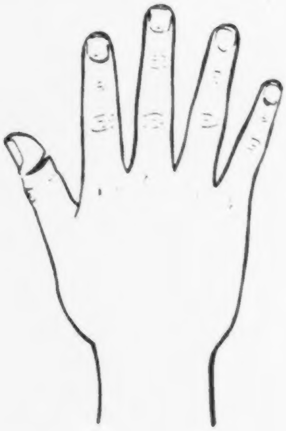
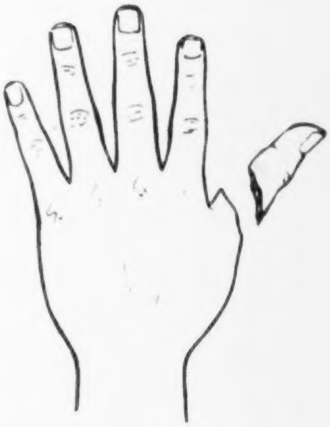


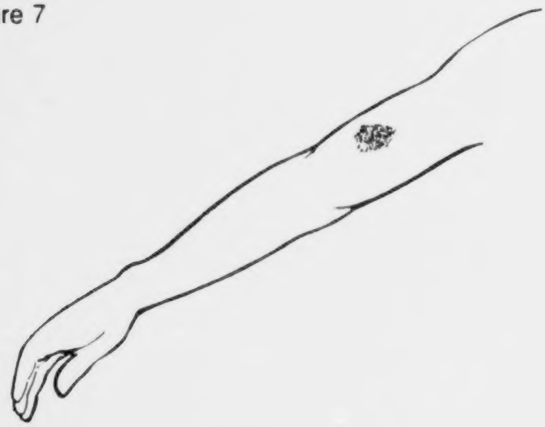
Figure 6—Complete



Information Sheet

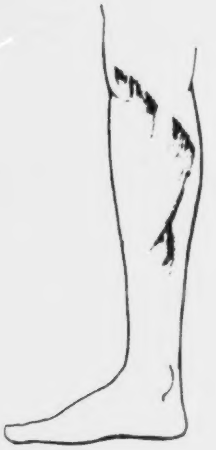
c. **Contusion** — A bruise that may be caused by a blunt instrument in which skin is not broken, the tissues below the surface are damaged, and the blood vessels have ruptured causing discoloration

Figure 7



d. **Crushed** — A wound that has been squeezed or forced by pressure so as to alter or destroy the tissue structure

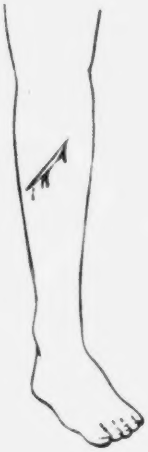
Figure 8



Information Sheet

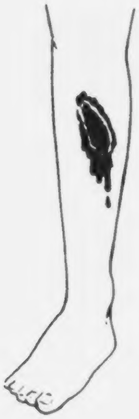
e. **Incised** — A wound with smooth edges that is made by a cutting instrument; may be contaminated (cut with ordinary glass) or clean (cut by knife in surgery)

Figure 9



f. **Laceration** — A torn wound with irregular edges

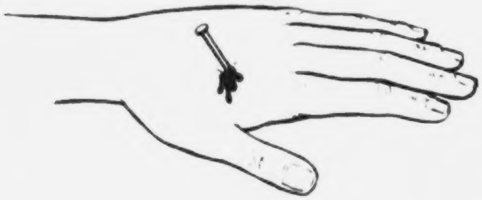
Figure 10



Information Sheet

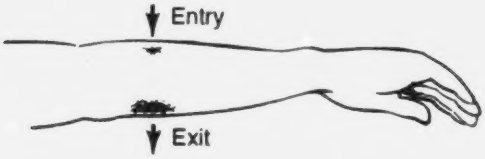
g. **Puncture** — A wound made by a sharp, pointed instrument

Figure 11



h. **Perforation** — A wound in which the vulnerating body (such as bullet) both enters and emerges from the cavity

Figure 12



Information Sheet

7. Classifications of surgical (operative) wounds—AORN

Note: At the end of the surgical procedure the circulating nurse records the wound classification in the operative record.

a. **Clean wound** (expected infection rate: 1% to 5%)

   (1) Elective procedure; wound made under ideal conditions

   (2) Primary closure, no drain

   (3) No breaks in aseptic technique

   (4) No inflammation present

   (5) Alimentary, genitourinary, or respiratory tracts or oropharyngeal cavity not entered

b. **Clean-contaminated wound** (expected infection rate: 8% to 11%)

   (1) Primary closure, wound drained

   (2) Minor breaks in aseptic technique occurred

   (3) No inflammation present

   (4) Alimentary, genitourinary, or respiratory tract or oropharyngeal cavity entered under controlled conditions — without unusual contamination or spillage

   Note: This includes hysterectomies, transection of appendix or cholecystic duct in the absence of acute inflammation, and entrance into genitourinary or biliary tracts in the absence of infected bile or urine.

c. **Contaminated wound** (expected infection rate: 15% to 20%)

   (1) Open fresh traumatic wound of less than four hours old

   (2) Major break in aseptic technique occurred

   (3) Acute, nonpurulent inflammation present

   (4) Gross spillage/contamination from gastrointestinal tract

   (5) Entry into biliary or genitourinary tracts with infected bile or urine present

Information Sheet

d. **Dirty and infected wound** (expected infection rate: 27% to 40%)

   (1) Old traumatic wound of over four hours old from a dirty source or the presence of necrotic tissue, foreign body, or fecal material

   (2) Microbial contamination is present in the operative field before the procedure

   (3) Acute bacterial inflammation is present; may be purulent or there is a known clinical infection

   (4) Presence of a perforated organ such as a bowel

8. **Factors influencing wound healing**

   a. Type of wound

   b. Physical condition of patient

   c. Operative technique

9. **Factors making up physical condition of patient and their effect on healing**

   a. Age, weight, and general health

      (1) Skin tone and muscle tone decrease with age.

      (2) Excess fat causes difficulty in confining and securing good closure, and is the most vulnerable of all tissues to trauma and infection.

      (3) Associated diseases such as diabetes, anemia, cirrhosis, and leukemia can delay the wound-healing process. Malignancies, debilitating injuries, and systemic or localized infections can also adversely affect wound healing.

   b. Adequate nutrition

      (1) Wound healing is impaired by deficiencies in zinc, protein, carbohydrates, and vitamins A, B, and C.

      (2) Protein provides essential amino acids for new tissue construction.

      (3) Vitamin C permits collagen formation and also aids in the production of connective tissue and a strong scar.

      (4) Carbohydrates are necessary for healing.

      (5) Vitamin B is necessary for carbohydrate metabolism.

Information Sheet

c. Fluid and electrolyte balance — Changes in this balance can affect kidney function, cellular metabolism, oxygen concentration in circulation, or hormonal function.

d. Immune response

   (1) Normal immune response speeds tissue healing.

   (2) Abnormalities in immune responses such as allergic reactions can contribute to delayed wound healing.

   (3) Immunosuppressed/compromised host — Lack of a functioning immune system can be life threatening.

e. Drug therapy — Since wound healing is basically collagen synthesis, any agents that interfere with cellular metabolism such as steroids have a potentially deleterious effect on the healing process.

f. Radiation therapy

   (1) Healing is delayed if the patient has had radiation in large doses preoperatively.

   (2) The blood supply in irradiated tissue is decreased; however, little change from the normal healing pattern occurs if radiation has been given in low doses.

g. Postoperative complications

   (1) Edema, vomiting, or coughing can place stress on the healing wound before fibroplasia takes place.

   (2) Complications in other parts of the body, far from the site of operation, such as pneumonia or thrombus or embolus formation, can inhibit oxygen supply to the wound site.

h. Physical activity — Early ambulation speeds up circulation and decreases post operative complications.

Information Sheet

10. Effects of operative technique on healing

a. Aseptic technique — Must by followed by all of the operating room team to promote healing and prevent infection.

b. Hemostasis — Must be achieved to prevent loss of the patient's blood and to provide as bloodless a field as possible for accurate dissection, and to prevent hematoma formation

c. Tissue handling

   (1) All tissues should be handled as gently and as little as possible throughout the operation.

   (2) Incisions should be just long enough to afford sufficient operating space.

   (3) Laparoscopes are used more frequently because they minimize tissue trauma (only require a puncture) and speed healing.

   (4) Careful consideration is given to underlying blood vessels and nerves to preserve as many as possible.

   (5) Retractors are placed to provide exposure but without causing undue pressure on tissues and organs or tension on muscles.

   Note: Trauma to tissues in dissecting, handling with instruments, ligating, or suturing may cause edema and necrosis with resultant slow healing.

d. Tissue approximation

   (1) Tissue edges are brought together with precision, avoiding strangulation and eliminating dead space, to promote wound healing.

   (2) Too tight a closure under tension causes ischemia (a decrease of blood supply to the tissues).

   (3) Serum or blood may collect in a dead space and prevent healing by keeping the cut edges of tissue separated.

   (4) Wound edges not in close contact cannot heal readily.

   (5) A drain may be inserted to aid in removal of fluid or air from the operative site postoperatively or a pressure dressing may be applied over the closed wound to help obliterate dead space.

Information Sheet

e. Wound closure

(1) Drainage tubes may cause a weak spot in the incision, or provide an inlet for microorganisms as well as an outlet for drainage; therefore, drains may be placed through a stab wound in the skin rather than through the operative incision.

(2) When sutures are used, the suture material provides all of the strength of the wound immediately after closure.

(3) Closely spaced sutures give a stronger suture line.

(4) The strength of a suture should not be greater than the strength of the tissue on which it is used.

(5) To minimize tissue reaction to sutures, the least amount and smallest size suture consistent with the holding power of the tissue is used.

11. Types of wound disruption

a. Dehiscence — Separation of the layers of a surgical wound

b. Evisceration — Extrusion of internal organs or viscera resulting from wound dehiscence. A portion of the wound may remain closed.

c. Eventration — Partial protrusion of the abdominal contents through an opening in the abdominal wall

12. Characteristics of wound disruption

a. May occur in a small percentage of clean, surgical, abdominal wounds

b. Usually happens between 4th and 6th postoperative day

c. Symptoms

(1) Patient may feel something give way.

(2) There may be a profuse amount of sero-sanguinous drainage on abdominal dressing.

(3) Contour of abdomen may change with marked bulging or actual spilling out of abdominal organs through incision.

Information Sheet

d. Causes

(1) Infection

(2) Abdominal distention

(3) Type and direction of incision

(4) Nutritional status of patient

(5) Coughing, straining, unusual activity

(6) Diseases

Wound Healing
Unit 4-D

Student Supplement 1—Review Terminology Related to Wound Healing

Name ______________________________ Date ______________

Directions: Fill in the blank with the term that completes or describes the phrase.

______________ a. Decrease of blood supply to the tissue

______________ b. Open wound in which the conditions and/or object surrounding the injury are obviously not clean or if the wound is over six hours old

______________ c. Tumor or swelling which contains blood

______________ d. Class of traumatic wound in which the skin is broken

______________ e. Phase of first intention wound healing in which scar forms

______________ f. Canal or passage leading to an abscess

______________ g. When the orderly closure of a wound is altered; usually suture lines break down, decreasing support of abdominal wall over peritoneal contents

______________ h. Fibrous connective tissue containing blood vessels and lymphatics; not visible in first intention healing

______________ i. A portion of the skin and soft tissue is partially or completely torn away

______________ j. Wound is **NOT** closed (sutured) in healing by ______ intention

______________ k. A wound made by a sharp, pointed instrument

______________ l. Scar left by a healed wound

______________ m. Must be followed by all operating team members to promote healing and prevent infection

______________ n. Constituent of blood that aids in coagulation

______________ o. A wound in which the vulnerating body (such as bullet) both enters and emerges from the cavity

Student Supplement 1

__________ p. Blood-tinged or colored serous drainage

__________ q. Similar to second intention healing except wound is sutured, either delayed or secondary

__________ r. Injury to body tissue produced by violence or any chemical, thermal, or other extrinsic agent

__________ s. A wound caused by mechanical irritation such as boot rubbing, scraping, or being injured with sandpaper

__________ t. Phase of first intention healing in which scab forms

__________ u. A torn wound with irregular edges

__________ v. White protein contained in connective tissues and bones

__________ w. Class of traumatic wound in which the skin is intact, but the underlying tissue is injured

__________ x. Wounds that will not heal by 2nd intention and may be caused by extrinsic or intrinsic factors

__________ y. Control of bleeding

__________ z. A wound with smooth edges that is made by a cutting instrument

__________ aa. Extrusion of internal organs or viscera resulting from wound dehiscence. A portion of the wound may remain closed.

__________ bb. A bruise that may be caused by a blunt instrument in which skin is not broken, the tissues below the surface are damaged, and the blood vessels have ruptured causing discoloration

__________ cc. Death of tissue cells

__________ dd. Separation of the layers of a surgical wound

__________ ee. Dense, unsightly connective tissue or excessive scar formation that is often removed surgically

__________ ff. Removal of foreign material; cutting away all dead and devitalized tissues leaving an open, clean wound where anaerobic organisms cannot survive

__________ gg. AORN classification of surgical wound with an expected infection rate of only 1% - 5%

Wound Healing
Unit 4-D

Assignment Sheet 1—Classify Surgical and Traumatic Wounds

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Surgical wounds are correctly classified	______
Traumatic wounds are correctly classified	______

Directions: Read the scenarios, and then classify the type of wound as one of the following:

Classes of Surgical Wounds	Classes of Traumatic Wounds
Clean	Simple, clean
Clean-contaminated	Simple, contaminated
Contaminated	Complicated, clean
Dirty and infected	Complicated, contaminated

Part I—Classes of Surgical Wounds

________________ a. A man was operated on for a perforated bowel. During surgery, there was considerable inflammation and fecal material present.

________________ b. A woman had a hysterectomy. Acute inflammation was not present.

________________ c. A young teenager's appendix ruptured and was then removed. Acute, purulent infection was present.

________________ d. A man had a face-lift. There were no breaks in aseptic technique.

________________ e. A woman had a cholecystectomy. Acute, non-purulent inflammation and infected bile were present.

Assignment Sheet 1

Part II—Classes of Traumatic Wounds

____________________ f. Woman fractured her ribs, and the skin was broken.

____________________ g. Boy scraped his knee on the sidewalk pavement.

____________________ h. Man cut his finger on a sharp, clean knife.

____________________ i. Older woman's leg wound from a dog bite failed to heal and required full thickness skin grafting.

____________________ j. Male plumber lacerated his hand with the tool used to clean out a sewer pipe.

Wound Healing
Unit 4-D

Assignment Sheet 2—Determine Types of Traumatic Wounds

Name ______________________________ Overall Rating __________

Evaluation criterion	**Rating**
Traumatic wounds are correctly identified according to type	______

Directions: Read the following descriptions, and then determine which one of the following types they are:

Types of Traumatic Wounds

- Abrasion
- Avulsion, partial or complete
- Contusion
- Crushed
- Incised
- Laceration
- Puncture
- Perforation

______________ a. A bullet enters a woman's right arm, front side, and exits the back side of the arm.

______________ b. While moving, a piano is dropped on a man's leg resulting in a fracture, soft tissue damage, and torn skin.

______________ c. A woman catches her hand in the lawn mower blades, and a finger is almost totally cut off.

______________ d. A man steps on a tack.

______________ e. A young girl is cut by a razor blade.

______________ f. A boy is cut by a jagged piece of metal.

______________ g. A girl scrapes her leg sliding into home base.

______________ h. A man is hit with a baseball. A bruise occurs.

Wound Healing
Unit 4-D

Assignment Sheet 3—Distinguish Between Positive and Negative Effects on Wound Healing

Name ______________________________ Overall Rating __________

Evaluation criteria	Rating
Patient conditions are correctly identified as positive or negative effects on healing	______
Operative techniques are correctly identified as positive or negative effects on healing	______

Directions: Identify the following patient conditions and operative techniques as having positive (P) or negative (N) effects on healing.

Patient Conditions

______a. Decreased muscle tone

______b. Excessive fatty tissue

______c. Good muscle tone

______d. Good health, no disease process present

______e. Vitamins A, B, and C are being consumed

______f. Diet is high in fat and low in carbohydrates

______g. Diet contains no protein (amino acids)

______h. Adequate fluids are being consumed and electrolytes are in balance

______i. Immune responses are normal

______j. Immunosuppressant drugs are being taken

______k. Tissue presently being treated with radiation therapy

______l. Evidence of postoperative swelling

______m. Early ambulation

______n. Evidence of postoperative thrombus formation

Assignment Sheet 3

Operative Techniques

_______o. Strict aseptic technique

_______p. Lack of hemostasis

_______q. Tissue handled very gently and as little as possible

_______r. Adequate, but minimal, length of incision

_______s. Careful placement of retractors

_______t. Leaving undrained dead spaces

_______u. Precise wound closure that avoids strangulation

_______v. Loose wound closure, leaving a space between wound edges

_______w. Sutures are very tight and far apart

_______x. Draining a dead space through a separate stab incision

_______y. Draining a dead space with drain directly in wound

_______z. Using the least amount and smallest size of suture consistent with the holding power of the tissues

Weights and Measures
Unit 1-E

Objective Sheet

Unit Objective

After completing this unit, the student should be able to state metric equivalents for weight, capacity, and length and use metric abbreviations. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to weights and measures with their correct definitions.
2. Select true statements concerning the metric system of measurement.
3. Match metric prefixes with the correct amounts.
4. State metric equivalents of weight, capacity, and length.
5. List advantages of the metric system.
6. State abbreviations for metric weights and measures.
7. Distinguish between systems for measuring temperature.
8. Solve problems concerning metric equivalents. (Assignment Sheet 1)
9. Use abbreviations for metric weights and measures. (Assignment Sheet 2)

Weights and Measures
Unit 1-E

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.
2. Review Teaching Suggestions section that follows. Plan for classroom activities.
3. Plan for students with special needs.
4. Make a transparency from the transparency master included with this unit. This appears in the teacher edition only and is designed to be used with the following objective:

   TM 1—Basic Units of Metric System (Objective 2)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.
6. Develop teaching plan. Adjust for different learning styles.
7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.
9. Discuss unit and specific objectives.
10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
11. Discuss the student supplements. These could be used as homework assignments, daily practice exercises, or quizzes. Explain to students how you plan to evaluate the supplements, if at all.
12. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments or supplemental activities that should be part of the unit evaluation.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Provide examples of surgical supplies and drugs that are noted with metric weights or measures. Have students examine the packages to identify the weights and measures information. Hands-on experience reinforces tactile learning and helps students see the importance of weights and measures to surgery.

2. Have students practice using the metric system by converting their weights and heights to metric equivalents. This activity can be utilized to improve **math foundation skills**.

3. Discuss times when the metric system is used, when an alternative system (such as household) may be used, and when an alternative is unacceptable. **Creative thinking** skills will be reinforced in this activity.

4. Discuss the apothecary system of weights and capacities used by pharmacists and how this system applies to surgical technologists.

   a. Teacher Supplements 1 and 2 provide more information and an optional activity on the apothecary system.

   b. Make copies for your students as needed.

   c. Answers to the activity are on the back of Teacher Supplement 2.

   d. This activity reinforces **math foundation skills**.

Suggested Activities

5. Use Teacher Supplement 3 as a master listing of conversion charts. Enlarge and post in the classroom.

6. Student Supplement 1-4 give students practice exercises using various conversion charts. These activities reinforce **math foundation skills**.

Resources Used in Developing This Unit

1. Asperheim, Mary Kaye. *Pharmacology: An Introductory Text*, 7th ed. Philadelphia: W. B. Saunders Company, 1992.
2. Batastini, Peggy H. and Judy K. Davidson. *Pharmacological Calculations for Nurses: A Worktext*, 2nd ed. New York: Delmar Publishers Inc., 1992.
3. Clayton, Bruce D. *Basic Pharmacology for Nurses*. St. Louis: C. V. Mosby Company, 1992.
4. Cornett, Emily F. and Dorothy Blume. *Dosage and Solutions*. Philadelphia: F. A. Davis Company, 1991.
5. Fuller, Joanna. *Surgical Technology: Principles and Practice*. Philadelphia: W. B. Saunders Co., 1986.
6. Hitner, H. and Barbara Nagle. *Basic Pharmacology for Health Occupations*. Indianapolis: Bobb-Merrill Educational Publishing, 1987.
7. Reiss, Barry S. and Mary E. Evans. *Pharmacological Aspects of Nursing Care*, 3rd ed. New York: Delmar Publishers Inc., 1990.

Suggested Supplemental Resource

Med Math Master Review — Interactive computer program covering basic math, medication problems, and drug calculations using four systems of measurement. Hardware requirements: IBM/MS-DOS compatible microcomputer with 256kB of RAM and at least one 360kB floppy disk drive. Available from:

Health Sciences Consortium
201 Silver Cedar Court
Chapel Hill, NC 27514-1517
919-942-8731

Weights and Measures
Unit 1-E

Answers to Assignment Sheets

Assignment Sheet 1

WEIGHT

1. 2.2
2. 1000
3. 15
4. 750
5. 10
6. 500
7. 0.1
8. 0.025
9. 1
10. 0.065
11. 65
12. 30
13. 110
14. 220
15. 30

CAPACITY

16. 1
17. 15
18. 30
19. 8
20. 4
21. 1000
22. 1.06
23. .5
24. 750
25. 2

LENGTH

26. 1000
27. 2.54
28. 152.4
29. .1
30. 1000
31. 1.778
32. 1000
33. 12
34. .610

Assignment Sheet 2

1. 522 gm
2. 15 mg
3. 12.5 cc
4. 2.5 gm
5. 150 kg
6. 6 m
7. 2 L
8. 5 cm
9. 25 mm
10. 1 gm

Weights and Measures
Unit 1-E

Answers to Student Supplements

Student Supplement 1

Note: The variations in answers for 6, 7, and 8 depend upon whether students multiply by 0.45 or divide by 2.2.

1. 20 gm
2. 3.855 dr
3. 12000 mg
4. 150 gm
5. 45 gr
6. 64.8 kg or 65.5 kg
7. 99 kg or 100 kg
8. 83.25 kg or 84.1 kg
9. 136.4 lb
10. 228.8 lb

Student Supplement 2

1. 360 ml
2. 16 fl dr
3. 10.5 pt
4. 500 ml
5. 28 cc
6. 20 cc
7. .68 fl oz
8. .81 fl dr
9. 8 cc
10. 2 cc

Student Supplement 3

1. 472.44″
2. .1525 M
3. 101.6 mm
4. 3.2″
5. 3.05 M
6. 1.6774 M
7. 1.83 M
8. 71″ or 5′ 11″
9. 1.016 M
10. 1.8796 M

Student Supplement 4

1. 53.6°F
2. 86°F
3. 224.6°F
4. 32°F
5. 41°F
6. 26.67°C
7. 37.78°C
8. 0°C
9. 15°C
10. 38.89°C

Weights and Measures
Unit 1-E

Answers to Written Test

1. a. 4
   b. 3
   c. 2

2. b, c, d, f

3. a. 8
   b. 5
   c. 2
   d. 6
   e. 3
   f. 7
   g. 1
   h. 4

4. a. 1000
   b. 2.2
   c. 1000
   d. 30
   e. Liter
   f. Kiloliter
   g. 1000
   h. 30
   i. 4
   j. 100
   k. 36
   l. 2.54

5. Any one of the following:

   a. All standard units of weight and measurement bear a simple relation to the fundamental unit, the meter.
   b. The prefixes deci, centi, milli, deka, hecto, and kilo have a numerical significance and have other applications in our language that make them readily understood.
   c. The uniform decimal scale of relation between the successive units makes the use of decimal notation possible.

6. a. gm
   b. mg
   c. kg
   d. L
   e. ml
   f. cc
   g. M
   h. mm
   i. cm

7. b, d

Weights and Measures
Unit 1-E

Written Test

Name ______________________________ Score ______________

1. Match the terms on the right with the correct definitions.

   _______a. Unit of linear measurement in the metric system

   _______b. Unit of fluid measurement in the metric system; volume occupied by one kilogram of water at 4° centigrade; slightly more than one quart

   _______c. Unit of weight in the metric system; weight of one cubic centimeter of water at 4° centigrade

   1. Grain
   2. Gram
   3. Liter
   4. Meter

2. Select true statements concerning the metric system of measurement by placing an "X" in the blanks next to the true statements.

   _______a. Invented by the United States in the late eighteenth century.

   _______b. Based on the decimal system; uses units and multiples of tens.

   _______c. Uses abbreviations and Arabic numerals for written measurements of medication.

   _______d. One thousand milliliters is written 1000 ml or 1000 cc.

   _______e. Basic unit of weight is the grain.

   _______f. Basic units of measurement include meter, liter, and gram.

   _______g. Basic unit of fluid measure is the minim.

Written Test

3. Match metric prefixes on the right with the correct amounts.

______a. One-millionth — 0.000001

______b. One-thousandth — 0.001

______c. One-hundredth — 0.01

______d. One-tenth — 0.1

______e. One — 1.0

______f. Ten — 10.0

______g. One hundred — 100.0

______h. One thousand — 1000.0

1. Hecto
2. Centi
3. Unit
4. Kilo
5. Milli
6. Deci
7. Deka
8. Micro

4. State metric equivalents of weight, capacity, and length.

a. 1 gram = ________________ milligrams

b. 1 kilogram = ________________ pounds

c. 1 kilogram = ________________ grams

d. 1 ounce = ________________ grams

e. 1 ________________ = 1000 milliliters

f. 1000 liters = 1 ________________

g. 1 liter = ___________ cubic centimeters or milliliters

h. 1 fluid ounce = 8 fluid drams = ________________ cubic centimeters or milliliters

i. 1 fluid dram = ________________ cubic centimeters

j. 1 meter = ________________ centimeters

k. 1 yard = ________________ inches

l. 1 inch = ________________ centimeters

Written Test

5. List one advantage of the metric system.

____

____

6. State the abbreviations for the following metric weights and measures.

   a. Gram = ______

   b. Milligram = ______

   c. Kilogram = ______

   d. Liter = ______

   e. Milliliter = ______

   f. Cubic centimeter = ______

   g. Meter = ______

   h. Millimeter = ______

   i. Centimeter = ______

7. Distinguish between systems for measuring temperature by placing an "X" next to the statements associated with the Fahrenheit system.

   ______a. Water freezes at 0°

   ______b. Water freezes at 32°

   ______c. Water boils at 100°

   ______d. Water boils at 212°

*Permission to duplicate this test is granted.**

Weights and Measures
Unit 1-E

Unit Evaluation Form

Student Name ______________________ Unit Rating __________

Assignment Sheet 1—Solve Problems Concerning Metric Equivalents Rating ______

Comments: ____

____

Assignment Sheet 2—Use Abbreviations for Metric Weights and Measures Rating ______

Comments: ____

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

____

Teacher Signature ______________________ Date __________

Student Signature ______________________ Date __________

*Permission to duplicate this form is granted.

Weights and Measures
Unit 1-E

Teacher Supplement 1—Apothecary System

A. Characteristics of apothecary system

1. Based on weights and volumes of simple items such as a grain of wheat, a small stone, or a container of liquid. Began in ancient Greek and Roman times.

2. Used chiefly by pharmacists.

   Note: There are some pharmacologic agents that you will be handling that are measured according to this system.

3. Roman numerals indicate quantities and are preceded by symbols or abbreviations.

   Examples: One and one-half drams is written ʒ $\overline{\text{iss}}$

   Three ounces is written ℥ $\overline{\text{iii}}$

4. Basic unit of weight is the grain.

5. Basic unit of fluid measure is the minim.

B. Apothecaries' equivalents of weight and capacity

1. Weight
   - a. 60 grains = 1 dram
   - b. 8 drams = 1 ounce
   - c. 12 ounces = 1 pound

2. Capacity
   - a. 60 minims = 1 fluid dram (f ʒ i)
   - b. 8 fluid drams = 1 fluid ounce (f ℥ i)
   - c. 16 fluid ounces = 1 pint
   - d. 2 pints = 1 quart
   - e. 4 quarts = 1 gallon

***Permission to duplicate this form is granted.**

Weights and Measures
Unit 1-E

Teacher Supplement 2—Apothecary Activity (Optional)

Name ______________________________ Date ______________

Directions: State the equivalents for the following amounts.

1. 1 dram = ______________ grains
2. 1 dram = ______________ ounces
3. 1 ounce = ______________ drams
4. 1 pound = ______________ ounces
5. 4 drams = ______________ ounces
6. ½ ounce = ______________ drams
7. 1 fluid ounce = ______________ fluid drams
8. 1 fluid dram = ______________ minims
9. 1 pint = ______________ fluid ounces
10. 6 fluid drams = ______________ fluid ounces

*Permission to duplicate this form is granted.

Teacher Supplement 2

Answer Sheet

1. 1 dram = 60 grains
2. 1 dram = ⅛ ounces
3. 1 ounce = 8 drams
4. 1 pound = 12 ounces
5. 4 drams = ½ ounces
6. ½ ounce = 4 drams
7. 1 fluid ounce = 8 fluid drams
8. 1 fluid dram = 60 minims
9. 1 pint = 16 fluid ounces
10. 6 fluid drams = ¾ fluid ounces

Weights and Measures
Unit 1-E

Teacher Supplement 3—Conversion Charts

WEIGHT CONVERSION CHART

WHEN YOU KNOW	YOU CAN CONVERT TO	WHEN YOU MULTIPLY BY
Ounces	Grams (or ml)	30.
Grams (or ml)	Ounces	0.035
Pounds	Kilograms	0.45
Kilograms	Pounds	2.2
Grains	Grams (or ml)	0.065
Grams (or ml)	Grains	15.
Drams	Grams (or ml)	4.
Grams (or ml)	Drams	0.257
Grams (or ml)	Milligrams	1000.
Milligrams	Grams (or ml)	0.001

CAPACITY CONVERSION CHART

WHEN YOU KNOW	YOU CAN CONVERT TO	WHEN YOU MULTIPLY BY
Liters	Gallons	0.26
Gallons	Liters	3.8
Liters	Quarts	1.06
Quarts	Liters	0.95
Liters	Pints	2.1
Pints	Liters	0.47
Fluid ounces	Milliliters (or cc)	30.
Milliliters (or cc)	Fluid ounces	0.034
Minims	Milliliters (or cc)	0.06
Milliliters (or cc)	Minims	16.7
Fluid ounces	Fluid drams	8.0
Fluid drams	Fluid ounces	0.125
Fluid drams	Milliliters (or cc)	4.
Milliliters (or cc)	Fluid drams	0.27
Liter	Milliliter	1000.
Milliliter	Liter	0.001

Teacher Supplement 3

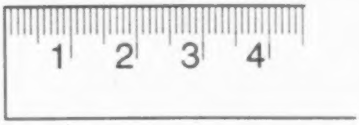
LENGTH CONVERSION CHART		
WHEN YOU KNOW	YOU CAN CONVERT TO	WHEN YOU MULTIPLY BY
Inches	Millimeters	25.4
Millimeters	Inches	0.04
Inches	Centimeters	2.54
Centimeters	Inches	0.4
Inches	Meters	0.0254
Meters	Inches	39.37
Feet	Meters	0.305
Meters	Feet	3.28
Meters	Centimeters	100.
Meters	Millimeters	1000.
Millimeters	Meters	0.001
Millimeters	Centimeters	0.01
Centimeters	Meters	0.01
Centimeters	Millimeters	10.

TEMPERATURE CONVERSION CHART		
WHEN YOU KNOW	YOU CAN CONVERT TO	WHEN YOU USE
Degrees Fahrenheit	Degrees Celsius	5/9 (F° −32) = C°
Degrees Celsius	Degrees Fahrenheit	9/5 (C°) +32 = F°

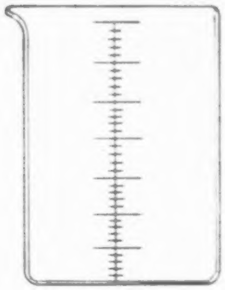
*Permission to duplicate this form is granted.

Basic Units of Metric System

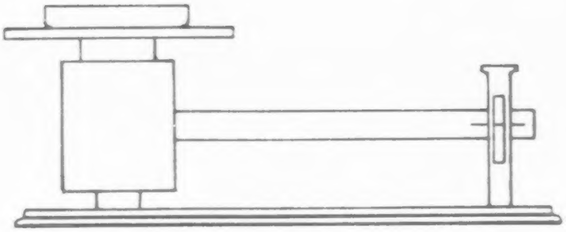
1. Meter — Length



2. Liter — Capacity



3. Gram — Weight



Weights and Measures
Unit 1-E

Information Sheet

1. **Terms and definitions**

   a. **Gram** — Unit of weight in the metric system; weight of one cubic centimeter of water at 4° centigrade

   b. **Liter** — Unit of fluid measurement in the metric system; volume occupied by one kilogram of water at 4° centigrade; slightly more than one quart

   c. **Meter** — Unit of linear measurement in the metric system

2. **Metric system of measurement**

   a. Invented by the French in the late eighteenth century.

   b. Based on the decimal system; uses units and multiples of tens.

   c. Uses abbreviations and Arabic numerals for written measurements of medication.

   Examples: Ten grams is written 10 gm.
   One thousand milliliters or cubic centimeters is written 1,000 ml. or cc.

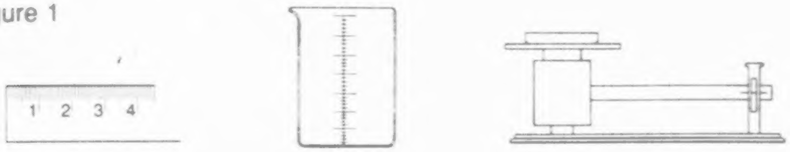
   d. Basic units of measurement include:

      (1) Meter for length

      (2) Liter for capacity

      (3) Gram for weight

Figure 1



Length (meter)

Capacity (liter)

Weight (gram)

Information Sheet

3. **Metric prefixes**

    a. Micro — One-millionth; 0.000001

    b. Milli — One-thousandth; 0.001

    c. Centi — One-hundredth; 0.01

    d. Deci — One-tenth; 0.1

    e. Unit — One; 1.0

    f. Deka — Ten; 10.0

    g. Hecto — One hundred; 100.0

    h. Kilo — One thousand; 1000.0

4. **Metric equivalents of weight, capacity, and length**

    a. Weight (gram)

        (1) 1 gram = 1000 milligrams

        Note: When an amount is less than a gram, it is written in decimal forms of the gram. For example, a dosage is never written as a decigram. Instead it would be expressed as 0.1 gm. An exception to this which is becoming more common is the milligram.

        (2) 1 kilogram = 1000 grams

        (3) 1 kilogram = 2.2 pounds

        Note: This is used when converting a patient's weight to kilograms.

        Example: A patient of 55 pounds weighs 25 kilograms
        55 lbs ÷ 2.2 = 25 kg

        (4) 1 ounce = 30 grams

    b. Capacity (liter)

        (1) 1 liter = 1000 milliliters

        (2) 1000 liters = 1 kiloliter

        (3) 1 liter = 1.06 quarts

Information Sheet

(4) 1 quart = 0.946 liters

Note: A liter and a quart may be considered approximately equal, but a quart is slightly smaller than a liter.

(5) 1 milliliter weighs 1 gram.

(6) 1 cubic centimeter (cc) and 1 milliliter (ml) are considered equal in practice.

(7) 1 liter = 1000 cubic centimeters or milliliters

(8) 1 fluid ounce = 8 fluid drams = 30 cubic centimeters or milliliters

(9) 1 fluid dram = 60 minims = 0.125 fluid ounce = 4 cubic centimeters

(10) 1 gallon = 3.8 liters

c. Length (meter)

(1) 1 meter = 1000 millimeters = 100 centimeters = 1.094 yard

(2) 1 yard = 3 feet = 36 inches = 0.9144 meters

Note: A meter and a yard may be considered approximately equal, but a yard is slightly smaller.

(3) 1 inch = 2.54 centimeters = 25.4 millimeters

Note: Centimeters and millimeters are often used in the measurement of body organs.

(4) 1 micron (micrometer) = .001 millimeter = .000001 meter

Note: The micron is used in measuring minute distances such as sizes of bacteria.

5. Advantages of the metric system

a. All standard units of weight and measurement bear a simple relation to the fundamental unit, the meter.

b. The prefixes deci, centi, milli, deka, hecto, and kilo have a numerical significance and have other applications in our language that make them readily understood.

Examples: U.S. penny is 1 cent which equals $\frac{1}{100}$ of a dollar. Decade consists of 10 years. Decathlon has 10 events.

c. The uniform decimal scale of relation between the successive units makes the use of decimal notation possible.

Information Sheet

6. **Abbreviations used for metric weights and measures**

   a. Gram — gm

   b. Milligram — mg

   c. Kilogram — kg

   d. Liter — L

   e. Milliliter — ml

   f. Cubic centimeter — cc

   g. Meter — M

   h. Millimeter — mm

   i. Centimeter — cm

7. **Systems for measuring temperature**

   Note: In some hospitals the Celsius thermometer is used to test the temperature of solutions and the Fahrenheit thermometer is used to take the patient's temperature.

   a. Fahrenheit (F)

      (1) Water freezes at 32°

      (2) Water boils at 212°

   b. Celsius (centigrade) (C)

      (1) Water freezes at 0°

      (2) Water boils at 100°

Weights and Measures
Unit 1-E

Student Supplement 1—Use Weight Conversion Chart

Name ______________________________ Date ______________

Directions: Use the conversion chart given to calculate the problems below.

WEIGHT CONVERSION CHART

WHEN YOU KNOW	YOU CAN CONVERT TO	WHEN YOU MULTIPLY BY
Ounces	Grams (or ml)	30.
Grams (or ml)	Ounces	0.035
Pounds	Kilograms	0.45
Kilograms	Pounds	2.2
Grains	Grams (or ml)	0.065
Grams (or ml)	Grains	15.
Drams	Grams (or ml)	4.
Grams (or ml)	Drams	0.257
Grams (or ml)	Milligrams	1000.
Milligrams	Grams (or ml)	0.001

1. 5 drams = ________________ grams
2. 15 grams = ________________ drams
3. 12 grams = ________________ milligrams
4. 5 ounces = ________________ grams
5. 3 grams = ________________ grains
6. 144 pounds = ________________ kilograms
7. 220 pounds = ________________ kilograms
8. 185 pounds = ________________ kilograms
9. 62 kilograms = ________________ pounds
10. 104 kilograms = ________________ pounds

Weights and Measures
Unit 1-E

Student Supplement 2—Use Capacity Conversion Chart

Name ______________________________ Date ____________

Directions: Use the conversion chart given to calculate the problems below.

CAPACITY CONVERSION CHART		
WHEN YOU KNOW	YOU CAN CONVERT TO	WHEN YOU MULTIPLY BY
Liters	Gallons	0.26
Gallons	Liters	3.8
Liters	Quarts	1.06
Quarts	Liters	0.95
Liters	Pints	2.1
Pints	Liters	0.47
Fluid ounces	Milliliters (or cc)	30.
Milliliters (or cc)	Fluid ounces	0.034
Minims	Milliliters (or cc)	0.06
Milliliters (or cc)	Minims	16.7
Fluid ounces	Fluid drams	8.0
Fluid drams	Fluid ounces	0.125
Fluid drams	Milliliters (or cc)	4.
Milliliters (or cc)	Fluid drams	0.27
Liter	Milliliter	1000.
Milliliter	Liter	0.001

1. 12 fluid ounces = ____________ milliliters
2. 2 fluid ounces = ____________ fluid drams
3. 5 liters = ____________ pints
4. .5 liters = ____________ milliliters
5. 7 fluid drams = ____________ cubic centimeters
6. 5 fluid drams = ____________ cubic centimeters
7. 20 milliliters = ____________ fluid ounces
8. 3 cubic centimeters = ____________ fluid drams
9. 2 fluid drams = ____________ cubic centimeters
10. .5 fluid drams = ____________ cubic centimeters

Weights and Measures
Unit 1-E

Student Supplement 3—Use Length Conversion Chart

Name ______________________________ Date ______________

Directions: Use the conversion chart given to calculate the problems below.

LENGTH CONVERSION CHART

WHEN YOU KNOW	YOU CAN CONVERT TO	WHEN YOU MULTIPLY BY
Inches	Millimeters	25.4
Millimeters	Inches	0.04
Inches	Centimeters	2.54
Centimeters	Inches	0.4
Inches	Meters	0.0254
Meters	Inches	39.37
Feet	Meters	0.305
Meters	Feet	3.28
Meters	Centimeters	100.
Meters	Millimeters	1000.
Millimeters	Meters	0.001
Millimeters	Centimeters	0.01
Centimeters	Meters	0.01
Centimeters	Millimeters	10.

1. 12 M = ______________ ″
2. .5′ = ______________ M
3. 4″ = ______________ mm
4. 80 mm = ______________ ″
5. 10′ = ______________ M
6. 5′ 6″ = ______________ M
7. 6′ 0″ = ______________ M
8. 1.8034 M = ______________ ″
9. 3′ 4″ = ______________ M
10. 6′ 2″ = ______________ M

Weights and Measures
Unit 1-E

Student Supplement 4—Use Temperature Conversion Chart

Name ______________________________ Date ____________

Directions: Use the conversion chart given to calculate the problems below.

TEMPERATURE CONVERSION CHART		
WHEN YOU KNOW	YOU CAN CONVERT TO	WHEN YOU USE
Degrees Fahrenheit	Degrees Celsius	5/9 (F° −32) = C°
Degrees Celsius	Degrees Fahrenheit	9/5 (C°) +32 = F°

1. 12°C = ______________ °F
2. 30°C = ______________ °F
3. 107°C = ______________ °F
4. 0°C = ______________ °F
5. 5°C = ______________ °F
6. 80°F = ______________ °C
7. 100°F = ______________ °C
8. 32°F = ______________ °C
9. 59°F = ______________ °C
10. 102°F = ______________ °C

Weights and Measures
Unit 1-E

Assignment Sheet 1—Solve Problems Concerning Metric Equivalents

Name ____________________ Overall Rating __________

Evaluation criteria	**Rating**
Numbers are expressed as whole and decimal	______
Problems are correctly solved	______

Directions: Solve the following problems of metric equivalents.

WEIGHT

1. 1 kilogram = ____________ pounds
2. 1 gram = ____________ milligrams
3. 1 gram = ____________ grains
4. 0.75 gram = ____________ milligrams
5. 0.01 gram = ____________ milligrams
6. 0.5 gram = ____________ milligrams
7. 100 milligrams = ____________ grams
8. 25 milligrams = ____________ grams
9. 15 (or 15.4) grains = ____________ grams
10. 1 grain = ____________ grams
11. 1 grain = ____________ milligrams
12. 1 ounce = ____________ grams
13. 50 kilograms = ____________ pounds
14. 100 kilograms = ____________ pounds
15. 2 grams = ____________ grains

Assignment Sheet 1

CAPACITY

16. 1 cubic centimeter = ___________________ milliliter

17. 15 milliliters = ___________________ cubic centimeters

18. 1 fluid ounce = ___________________ cubic centimeters

19. 1 fluid ounce = ___________________ fluid drams

20. 1 fluid dram = ___________________ milliliters

21. 1 liter = ___________________ cubic centimeters

22. 1 liter = ___________________ quarts

23. 500 liters = ___________________ kiloliters

24. .75 liter = ___________________ cubic centimeters

25. 60 cubic centimeters = ___________________ fluid ounces

LENGTH

26. 100 centimeters = ___________________ millimeters

27. 1 inch = ___________________ centimeters

28. 60 inches = ___________________ centimeters

29. 100 microns = ___________________ millimeters

30. 10 meters = ___________________ centimeters

31. 70 inches = ___________________ meters

32. 1 meter = ___________________ millimeters

33. 1 foot = ___________________ inches

34. 2 feet = ___________________ meters

Weights and Measures
Unit 1-E

Assignment Sheet 2—Use Abbreviations for Metric Weights and Measures

Name ______________________ Overall Rating __________

Evaluation criteria	**Rating**
Numbers are expressed as whole and decimal	______
Abbreviations are correct	______

Directions: Write the abbreviations for the following metric weights and measures.

1. Five hundred and twenty-two grams ________________
2. Fifteen milligrams ________________
3. Twelve and one-half cubic centimeters ________________
4. Two and a half grams ________________
5. One hundred and fifty kilograms ________________
6. Six meters ________________
7. Two liters ________________
8. Five centimeters ________________
9. Twenty-five millimeters ________________
10. One gram ________________

Pharmacologic Agents
Unit 2-E

Objective Sheet

Unit Objective

After completing this unit, the student should be able to distinguish between the types of drugs and complete statements concerning common drugs used in surgery. The student should demonstrate these competencies by completing the assignment sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to pharmacologic agents with the correct definitions.
2. List general purposes of drugs.
3. List forms of drugs.
4. List sources of drugs.
5. Distinguish among types of names that a drug may have.
6. Select common sources of information about drugs.
7. Match common classes of drugs used in surgery with their actions.
8. Select true statements concerning the characteristics of anticoagulants.
9. Complete statements concerning the characteristics of hemostatic agents.
10. Select true statements concerning characteristics of antibiotics/anti-infectives commonly used in surgery.
11. Complete statements concerning narcotic analgesics.
12. Select true statements concerning characteristics of diuretics.
13. Select true statements concerning characteristics of steroids.
14. Complete statements concerning characteristics of oxytocics.
15. Complete statements concerning characteristics of contrast media.

Objective Sheet

16. Match common dyes used in surgery with their correct descriptions.

17. Complete statements concerning characteristics of intravenous solutions, blood replacements, and blood substitutes.

18. Match miscellaneous drugs used in surgery for emergency situations with the correct descriptions.

19. Write abbreviations pertaining to the handling of medications.

20. Select true statements concerning the care and handling of medications.

21. Complete statements concerning the procedure for the surgical technologist to accept medications from the circulator.

22. Classify various drugs according to type. (Assignment Sheet 1)

Pharmacologic Agents
Unit 2-E

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Forms of Drugs (Objective 3)
   TM 2—Sources of Drugs (Objective 4)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the student supplements. These could be used as homework assignments, daily practice exercises, or quizzes. Explain to students how you plan to evaluate the supplements, if at all.

12. Discuss the assignment sheet. Review criteria for evaluation of this activity.

Suggested Activities

Evaluation

13. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

14. Make copies of the written test. Add or modify test items as needed.

15. Give written test.

16. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

17. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Provide a variety of drug information references for use in Teacher Supplement 1. Explain the process of looking up information in drug reference books. Exercises like this reinforce **creative thinking** and **critical thinking skills**.

2. Invite a local pharmaceutical sales representative to speak to your class about new drugs being used in surgery. Have the representative also show samples. This reinforces **communication skills** and **career development skills**.

3. Discuss drugs commonly used in your local hospitals or other trade names that have not been included in this unit. You may want your students to write those drugs in on their information sheets. This activity will reinforce **communication skills** and **basic foundation skills**.

4. Discuss medication mixtures commonly used in your local hospitals. Make up a work sheet with examples of mixtures and dilutions. Exercises like this will reinforce **math and science foundation skills** and **problem-solving skills**.

5. Obtain educational resource materials and pamphlets on alcohol and drug abuse from your local health department or substance abuse treatment centers. Share this information with the class. Discuss the most commonly abused substances. This activity can reinforce **communication skills** and **group effectiveness skills**.

6. Discuss controlled substances as they relate to the surgical technologist. This activity encourages **creative thinking** and **problem-solving skills**.

7. Review Objective 21, and make a job sheet for accepting medications onto the back table that correlates with your clinical affiliates. Emphasizing this skill helps **personal and career development**, as well as **organizational effectiveness skills**.

Suggested Activities

Resources Used in Developing This Unit

1. Asperheim, Mary Kaye. *Pharmacology: An Introductory Text*. 7th ed. Philadelphia: W. B. Saunders Company, 1992.

2. Atkinson, Lucy Jo. *Berry & Kohn's Operating Room Technique*. 7th ed. St. Louis: Mosby Year Book, 1992.

3. Batastini, Peggy H. and Judy K. Davidson. *Pharmacological Calculations For Nurses: A Worktext*. 2nd ed. New York: Delmar Publishers Inc., 1992.

4. Clayton, Bruce D. *Basic Pharmacology for Nurses*. 10th ed. St. Louis: C. V. Mosby Company, 1992.

5. Fuller, Joanna. *Surgical Technology: Principles and Practice*. Philadelphia: W. B. Saunders Co., 1986.

6. Hitner, H. and Barbara Nagle. *Basic Pharmacology for Health Occupations*. Indianapolis: Bobb-Merrill Educational Publishing, 1987.

7. Meeker, Margaret Huth, and Jane C. Rothrock. *Alexander's Care of the Patient in Surgery*. 9th ed. St. Louis: Mosby Year Book, Inc., 1991.

8. *Nursing 92 Drug Handbook*. Springhouse, PA: Intermed Communications, Inc., 1992.

9. Reiss, Barry S. and Mary E. Evans. *Pharmacological Aspects of Nursing Care*. 3rd ed. New York: Delmar Publishers Inc., 1990.

10. Shannon, Margaret T. and Billie Ann Wilson. *Govoni & Hayes Drugs and Nursing Implications*. 7th ed. Norwalk, CT: Appleton & Lange, 1992.

11. Sheridan, Eleanor, H. Robert Patterson, and Edward Gustafson. *Falconer's the Drug, the Nurse, and the Patient*. 7th ed. Philadelphia: W. B. Saunders Co., 1985.

12. Spratto, George R. and Adrienne L. Woods. *RN Magazine's NDR-92: Nurse's Drug Reference*. New York: Delmar Publishers, Inc., 1992.

13. Woodrow, Ruth. *Essentials of Pharmacology for Health Occupations*. 2nd ed. New York: Delmar Publishers, Inc., 1992.

Pharmacologic Agents
Unit 2-E

Answers to Student Supplements

Student Supplement 1

1. c
2. a
3. d
4. b
5. d
6. b
7. b
8. b
9. b
10. c
11. d
12. b
13. b
14. b
15. d
16. c
17. c
18. d
19. d
20. c
21. a
22. a
23. b
24. a
25. a
26. b
27. b
28. a
29. d
30. a
31. d
32. a
33. b
34. a
35. c
36. d
37. c
38. d
39. c
40. b

Student Supplement 2

1. T
2. T
3. T
4. F
5. T
6. T
7. T
8. F
9. F
10. F
11. T
12. T
13. T
14. F

Student Supplement 3

1. ung
2. s̄
3. IV
4. h
5. OU
6. cc
7. stat
8. q
9. os
10. IM
11. c̄
12. po, per os
13. L
14. OD
15. DC
16. pre-op
17. ml
18. OS
19. a̅a̅
20. Rx

Pharmacologic Agents
Unit 2-E

Answers to Assignment Sheet 1

a.	9	m.	7	y.	2
b.	11	n.	8	z.	11
c.	13	o.	6	aa.	9
d.	7	p.	2	bb.	15
e.	10	q.	10	cc.	9
f.	1	r.	14	dd.	8
g.	9	s.	11	ee.	2
h.	2	t.	2	ff.	9
i.	2	u.	3	gg.	14
j.	12	v.	8	hh.	8
k.	11	w.	6	ii.	5
l.	13	x.	9	jj.	4

Pharmacologic Agents
Unit 2-E

Answers to Written Test

1.	a.	8	j.	6	s.	32
	b.	12	k.	18	t.	25
	c.	15	l.	4	u.	36
	d.	11	m.	20	v.	31
	e.	1	n.	35	w.	26
	f.	13	o.	21	x.	29
	g.	9	p.	37	y.	30
	h.	5	q.	27	z.	34
	i.	19	r.	23		

2. a. Diagnosis
   b. Treatment of symptoms
   c. Treatment of diseases or dysfunctions
   d. Prevention of disease

3. Any three of the following:

   a. Solids
   b. Semi-solids
   c. Liquids
   d. Gases

4. a. Plants
   b. Minerals
   c. Animals
   d. Synthetic (or pharmaceutical)

5. a.

6. b, d, f

7.	a.	12	j.	23	s.	7
	b.	15	k.	20	t.	19
	c.	4	l.	21	u.	3
	d.	24	m.	16	v.	5
	e.	22	n.	8	w.	10
	f.	14	o.	9	x.	18
	g.	2	p.	1	y.	6
	h.	13	q.	17		
	i.	11	r.	25		

8. c, e, g

Answers to Written Test

9. a. Promote
   b. Vitamin K
   c. Never
   d. Thrombin
   e. Gelfoam®
   f. Avitene®
   g. Oxycel®
   h. Phenol

10. b, d, f, g, h, i

11. a. Relieve pain
    b. Regular
    c. Are
    d. Addictive
    e. Does not
    f. Sublimaze®
    g. Narcotic
    h. Short-term
    i. Must never, high
    j. Registered nurse
    k. A locked
    l. Narcan®

12. a, c

13. c

14. a. Contract the uterus
    b. Labor
    c. Cesarean section or therapeutic abortion
    d. One of the following: Synthetic oxytocin injection (Oxytocin®, Pitocin®, Syntocinon®, Uteracon®, or methylergonovine maleate {Methergine®})

15. a. Radiopaque
    b. Dark
    c. Strictures
    d. Heart
    e. Biliary
    f. Kidney
    g. Urinary
    h. Female
    i. Hyskon®

16. a. 5
    b. 3
    c. 1, 2, or 5
    d. 4

Answers to Written Test

17. a. When they come to the OR
    b. Anesthetic agents
    c. Normal saline solution
    d. Calories
    e. Lactated Ringer's
    f. Commonly
    g. Substitute

18. a. 1
    b. 6
    c. 5
    d. 8
    e. 7
    f. 4
    g. 2
    h. 11
    i. 9
    j. 3

19. a. IM
    b. sol
    c. os
    d. $\overline{aa}$
    e. prn
    f. $\overline{s}$
    g. $\overline{c}$
    h. IV
    i. $\overline{ss}$
    j. stat

20. b, d, e, g, i, k

21. a. 3
    b. 2
    c. 3

Pharmacologic Agents
Unit 2-E

Written Test

Name ______________________________ Score ______________

1. Match the terms on the right with the correct definitions.

Note: The terms on this page match the definitions on this page.

_____a. Beneath the skin

_____b. Within the skin

_____c. Limited to or pertaining to one part or place

_____d. To draw in breath; to inspire

_____e. Counteracts the action of something else

_____f. Within a muscle

_____g. Body's defense response of living tissue to injury; symptoms include pain, heat, swelling, and impaired function of affected area

_____h. Any chemical substance taken into the body for the purpose of affecting body function

_____i. Designating any route other than the alimentary canal

_____j. Liquid drug preparation which contains droplets of oil and fat in water

_____k. Plant fiber that has been combined with oxygen and made to resemble cotton or gauze; used to arrest bleeding by direct application to site of hemorrhage

_____l. Amount of medicine to be administered to a patient at one time

_____m. Abnormal sensation such as burning, prickling, "crawling," or feeling of insects crawling over the skin

1. Antagonist
2. Capsule
3. Dermal patches
4. Dosage
5. Drug
6. Emulsion
7. Food and Drug Administration
8. Hypodermic or subcutaneous
9. Inflammation
10. Inhalant
11. Inhale
12. Intradermal
13. Intramuscular
14. Intravenous
15. Local
16. Lozenge (troche)
17. Malignant hyperthermia
18. Oxidized cellulose
19. Parenteral
20. Paresthesia

Written Test

Note: The terms on this page match the defintions on this page.

______n. Pertaining to a particular area; local application, never injected

______o. Person licensed to prepare and dispense drugs

______p. Easily vaporized or evaporated

______q. Liquid containing a dissolved substance

______r. Book containing a selected list of medicinal preparations and their dosage forms; provides a description and the standards for purity and strength for each drug listed

______s. Generalized or affecting the entire body

______t. Physician's medication order

______u. Narrowing of blood vessels

______v. Liquid form of medication that must be shaken well before using because the drug particles are not evenly dissolved in the liquid

______w. To ward off or to prevent infection and disease

______x. Beneath the tongue

______y. Semi-solid substance which serves as a vehicle for medicines to be absorbed by the rectum, vagina, or urethra

______z. Solution which contains alcohol as the primary solvent

21. Pharmacist
22. Pharmacology
23. Pharmacopeia
24. Pharmacy
25. Prescription
26. Prophylactic
27. Solution
28. Styptics
29. Sublingual
30. Suppositories
31. Suspension
32. Systemic
33. Tablet
34. Tincture
35. Topical
36. Vasoconstriction
37. Volatile

2. List the four general purposes of drugs.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

Written Test

3. List three forms of drugs.

   a. ____________________

   b. ____________________

   c. ____________________

4. List the four sources of drugs.

   a. ____________________

   b. ____________________

   c. ____________________

   d. ____________________

5. Distinguish among types of names that a drug may have by placing an "X" next to the description of the brand name (trade name).

   ______a. Symbol ® is used behind the name

   ______b. Exact chemical formula of the drug

   ______c. Common name assigned to the drug when it is ready to be marketed

6. Select common sources of information about drugs by placing an "X" in the appropriate blanks.

   ______a. *Modern Drug Usage*

   ______b. *United States Pharmacopeia/Dispensing Information (USP/DI)*

   ______c. *Webster's New Collegiate Dictionary*

   ______d. *Physician's Desk Reference (PDR)*

   ______e. *Taber's Cyclopedic Medical Dictionary*

   ______f. *American Hospital Formulary Service Drug Information*

Written Test

7. Match common classes of drugs on the right with the correct actions.

______a. Acts directly on the heart

______b. Slows flow of blood

______c. Destroys bacteria and other pathogenic microorganisms

______d. Dilates blood vessels

______e. Suppresses mental tension and anxiety

______f. Increases the output of urine

______g. Relieves pain

______h. Reduces a body function or nerve activity

______i. Reduces the passing of impulses of autonomic nervous system; stops flow of secretions and gastric and bladder contractions

______j. Constricts blood vessels

______k. Stimulates uterine contractions

______l. Quiets and relaxes, but does not produce sleep

______m. Substance originating in an organ or gland which is carried by the bloodstream to its target organ; stimulates organ by chemical action to increase activity or to secrete another hormone

______n. Neutralizes the action of histamine in the body; frequently used in the treatment of allergies or allergic reactions

______o. Counteracts or diminishes inflammation or its effects

______p. Stimulates nerve fibers to release epinephrine

______q. Induces sleep; causes insensibility to pain

1. Adrenergic
2. Analgesic
3. Anesthetic
4. Antibiotic/anti-infective
5. Anticholinergic
6. Anticoagulant
7. Antidote
8. Antihistamine
9. Anti-inflammatory
10. Antipyretic
11. Antispasmodic
12. Cardiogenic
13. Depressant
14. Diuretic
15. Hemostatic
16. Hormone
17. Hypnotic
18. Muscle relaxant

Written Test

______r. Regulates or participates in normal metabolism, growth, and development of the body

______s. Prevents or counteracts the action of a poison

______t. Produces sleep; relieves pain; stronger than a hypnotic

______u. Produces loss of feeling

______v. Inhibits the parasympathetic responses; manifested by drying up of body secretions

______w. Reduces fever

______x. Relieves muscular tension

______y. Prevents or delays blood coagulation

19. Narcotic
20. Oxytocic
21. Sedative
22. Tranquilizer
23. Vasoconstrictor
24. Vasodilator
25. Vitamin

8. Select true statements concerning characteristics of anticoagulants by placing an "X" in the appropriate blanks.

______a. Are used to clot the blood

______b. Are never used during cardiovascular procedures

______c. Prevent clot formation around vessels when used as a irrigating solution in the surgical wound

______d. Anticoagulants cannot be given intravenously.

______e. The most common anticoagulant used is heparin sodium.

______f. Heparin comes in only one concentration.

______g. The principal post-op complication of anticoagulant therapy is spontaneous bleeding.

______h. The antagonist for heparin is Narcan®.

Written Test

9. Complete the following statements concerning the characteristics of hemostatic agents by circling the correct answers.

   a. Are used to (delay, promote) blood coagulation when there is excessive bleeding and when standard methods of hemostasis are not effective.

   b. (Vitamin K, Thrombin) is administered systemically as an hemostatic agent.

   c. Thrombin is (always, never) injected.

   d. (Thrombin, Avitene®) is a dry powder which is dissolved in sterile saline solution and may be used in conjunction with other topical hemostatic agents to control surgical bleeding.

   e. (Gelfoam®, Thrombin) is an absorbable gelatin sponge available in different sizes.

   f. (Avitene®, Gelfoam®) is a microfibrillar collagen hemostat which should be applied with dry smooth forceps.

   g. (Surgicel®, Oxycel®) is available in two forms—cotton and gauze.

   h. (Phenol, Helistat®) may be used to cauterize tissue, but must be neutralized with alcohol immediately.

10. Select true statements concerning characteristics of antibiotics/anti-infectives commonly used in surgery by placing an "X" in the appropriate blanks.

   ______a. Are used to relieve pain

   ______b. May be used as an irrigating solution or given intravenously

   ______c. Are available only in liquid form

   ______d. Topical anti-infective products (such as Neosporin® and Sterispray®) are available which can be used in surgery to protect the wound later after it is sutured.

   ______e. Penicillin G potassium is indicated for mild local infections.

   ______f. Bacitracin powder should be dissolved in saline solution and kept in the refrigerator. It is used topically as an irrigating solution; **never** injected.

   ______g. Bacitracin ointment is designed to be placed directly in the wound and does not need to be refrigerated.

   ______h. Kanamycin sulfate (Kantrex®) is indicated for serious infections caused by *Escherichia coli* and organisms resistant to other antibiotics.

   ______i. Polymyxin B sulfate (Aerosporin®) is used topically.

Written Test

11. Complete the following statements of narcotic analgesics by circling the correct answers.

    a. Are primarily used to (produce sleep, relieve pain).

    b. Are capable of causing dependence with (regular, irregular) use.

    c. (Are, Are not) capable of producing adverse effects.

    d. Morphine sulfate is a very potent, (addictive, non-addictive) opiate.

    e. Meperidine hydrochloride is a synthetic substitute for morphine sulfate and (does, does not) depress respirations.

    f. Fentanyl citrate, (Sublimaze®, Epifrin®) is used as an adjunct to general anesthesia.

    g. Sufenta® is a (narcotic, non-narcotic) analgesic used to maintain a balanced general anesthesia.

    h. Toradol® is a nonsteroid antiflammatory drug used for (long-term, short-term) pain relief.

    i. Cocaine (must, must never) be injected because of its (high, low) toxicity.

    j. In many hospitals, only the (surgical technologist, registered nurse) may obtain narcotics from the narcotic cabinet.

    k. According to federal laws, narcotic medications must be kept in (an unlocked, a locked) cabinet.

    l. Narcotic antagonists such as Lorfan® and (protamine sulfate, Narcan®) should be on hand to reverse the depressant effects of narcotics if needed.

12. Select true statements concerning characteristics of diuretics by placing an "X" in the appropriate blanks.

    _____a. Draw fluid away from tissues and into the urinary system

    _____b. In surgery, diuretics are commonly used to increase intraocular or intracranial pressure.

    _____c. Diuretics commonly used in surgery include mannitol (Osmitrol®) and furosemide (Lasix®).

13. Select true statements concerning characteristics of steroids by placing an "X" in the appropriate blanks.

    _____a. Are commonly used in surgery to protect the patient from radiation

    _____b. Steroids are particularly useful in pediatric surgery.

    _____c. Common steroids include Celestone®, Hexadrol®, and Solu-Cortef®.

Written Test

14. Complete the following statements concerning characteristics of oxytocics by filling in the blanks.

    a. Are used to ______________________

    b. Are used in obstetrics to induce ______________________

    c. Are used in surgery to expel uterine contents after a ______________________

    d. A commonly used oxytocic is ______________________

15. Complete the following statements concerning characteristics of contrast media by circling the correct answers.

    a. Are (radioactive, radiopaque) dyes used to outline various structures through x-ray.

    b. Commonly used in biliary surgery to determine the presence of stones, which appear as (dark, light) spots against the white contrast media.

    c. Commonly used in cardiovascular and gastrointestinal surgery to identify (enlargements, strictures).

    d. Meglumine diatrizoate (Cardiografin®) is used for radiography of the (brain, heart) and major blood vessels.

    e. Iodipamide (Cholografin®) is used for radiography of the (biliary, cardiovascular) system.

    f. Diatrizoate sodium (Renografin®) is used for radiography of the biliary tract, (adrenal, kidney), and other internal structures.

    g. Diatrizoate meglumine (Cystografin®) is used for radiography of the (biliary, urinary) tract.

    h. Iohexol (Omnipaque®) is used for radiography of the (female, pediatric) reproductive system.

    i. (Hypaque®, Hyskon®) is used to distend the uterine cavity during a hysteroscopy.

Written Test

16. Match common dyes used in surgery on the right with their correct descriptions.

______a. Used as a stain for the skin for marking purposes and also for urinary diagnostic procedures; may also be used to determine fallopian tube patency

______b. Colored solution for tracking fissures, fistulas, and determining the patency of structures (such as fallopian tubes)

______c. Used as a stain for marking the skin

______d. Used to stain cervical tissue

1. Brilliant green
2. Gentian violet
3. Indigo carmine
4. Lugol's solution
5. Methylene blue

17. Complete the following statements concerning characteristics of intravenous solutions, blood replacements, and blood substitutes by circling the correct answers.

a. Patients scheduled to receive a general anesthetic will have an intravenous solution started (when they go to recovery, when they come to the OR).

b. The intravenous route allows the surgical team (particularly the anesthesiologist) a convenient and efficient method for administering drugs and (oxygen, anesthetic agents).

c. (Normal saline solution, Dextrose solution) is the most common intravenous solution used to restore blood volume and compensate for fluid loss.

d. Dextrose solution is used for those patients requiring an easily metabolized source of (protein, calories).

e. (Langer's, Lactated Ringer's) solution is a physiologic salt solution that may be used to replenish the patient's supply of electrolytes (sodium, calcium, and potassium), to improve circulation, or to stimulate renal activity.

f. Blood replacements and substitutes are (commonly, rarely) given intravenously for patients having a significant blood loss.

g. Dextran® is a blood (replacement, substitute).

Written Test

18. Match miscellaneous drugs used in surgery for emergency situations on the right with the correct descriptions.

______a. A spasmolytic that is used to treat acute and chronic bronchial asthma, bronchospasm, pulmonary emphysema, Cheyne-Stokes respiration, and pulmonary edema

______b. An adrenergic used as a vasoconstrictor, as a cardiac stimulant, and to relax bronchioles

______c. A sedating antihistamine used with epinephrine to treat anaphylaxis

______d. An adrenergic used to restore blood pressure in acute hypotensive states

______e. An antiarrhythmic used to treat ventricular arrhythmias or ventricular tachycardia; also used as a local anesthetic agent

______f. A drug that acts directly on the myocardium used to treat congestive heart failure, atrial tachycardia, and atrial fibrillation and flutter; used to slow the heart rate and to strengthen contraction

______g. A drug used to treat bradycardia and bradyarrhythmia, also given preoperatively to dry secretions

______h. An alkalinizer used to treat metabolic acidosis, especially during cardiac arrest

______i. Vasodilator drug used to dilate small vessels for surgical procedures such as AV shunt or fistula or femoral-popliteal bypass

______j. A muscle relaxant given for treatment of malignant hyperthermia

1. Aminophylline (Aminophyllin®)
2. Atropine sulfate
3. Dantrolene®
4. Digitoxin (Purodigin®)
5. Diphenhydramine hydrochloride (Benadryl®)
6. Epinephrine (Adrenalin®)
7. Lidocaine hydrochloride (Xylocaine®)
8. Norepinephrine injection (Levophed®)
9. Papaverine®
10. Potassium
11. Sodium bicarbonate

Written Test

19. Write the correct abbreviations pertaining to the handling of medications next to their meanings.

    a. Intramuscular ____________________

    b. Solution ____________________

    c. Mouth ____________________

    d. Of each ____________________

    e. As needed ____________________

    f. Without ____________________

    g. With ____________________

    h. Intravenous ____________________

    i. One-half ____________________

    j. At once ____________________

20. Select true statements concerning the care and handling of medications by placing an "X" in the appropriate blanks.

    ______a. The surgical technologist often has to administer medications to the surgical patient.

    ______b. The surgical technologist is involved in preparing mixtures of drugs on the back table after proper cross-referencing with the circulator (registered nurse), and in obtaining certain medications for the surgeon intraoperatively.

    ______c. Medication may be accepted from vials that are cracked or chipped.

    ______d. Medications should **never** be accepted that appear discolored or suspicious.

    ______e. **Never** use drugs if you are in doubt about the identification of the drug.

    ______f. It is not necessary for the surgical technologist to read the medication label.

    ______g. **Never** use outdated medications. The composition and effect of the drug may be altered.

    ______h. **Never** label medications on back table.

    ______i. If medications are unlabeled and you are uncertain or have forgotten which basins contain which drugs, discard them all and request that new medications be distributed.

_______j. It is the responsibility of the surgeon to make certain that the correct drug, correct amount, and correct strength is administered.

_______k. Keep track of how much irrigation solution is used within the wound so that blood loss can be determined.

21. Complete the following statements concerning the procedure for the surgical technologist to accept medications from the circulator by placing the letter for the correct answer in the blanks provided.

_______a. Which member of the surgical team decides if medication will be needed for an operative procedure?

(1) Circulator
(2) Surgical technologist
(3) Surgeon

_______b. Which member of the surgical team is responsible for labeling the medication once it has been distributed to the sterile field?

(1) Circulator
(2) Surgical technologist
(3) Surgeon

_______c. Which member of the surgical team is responsible for informing the surgeon of all medications and mixtures as the drug is passed intraoperatively?

(1) Anesthesiologist
(2) Circulator
(3) Surgical technologist

***Permission to duplicate this test is granted.**

Pharmacologic Agents
Unit 2-E

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Classify Various Drugs According to Type Rating ______

Comments: ____

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

____

Teacher Signature ______________________________ Date __________

Student Signature ______________________________ Date __________

*Permission to duplicate this form is granted.

Pharmacologic Agents
Unit 2-E

Teacher Supplement 1—Optional Assignment—Use a Drug Information Reference

Note: The following student assignment is optional and may be used if time allows. Duplication is permitted.

Name ______________________________ Date ____________

Directions: Using a drug information reference such as the *Physician's Desk Reference* provided by your instructor, look up the required information for various drugs. Take a few minutes to become familiar with the way your drug reference book is divided so that you can turn to the correct page quickly and find needed information.

A. HEMOSTATIC AGENTS

Name of drug: ______________________________

Usual dosage: ______________________________

What it is used for: ______________________________

Side effects: ______________________________

____

____

____

B. ANTIBIOTICS

Name of drug: ______________________________

Usual dosage: ______________________________

What it is used for: ______________________________

Side effects: ______________________________

____

____

____

Teacher Supplement 1

C. ANTI-INFLAMMATORY AGENTS

Name of drug: ____________________

Usual dosage: ____________________

What it is used for: ____________________

Side effects: ____________________

____

____

____

D. ANTIHISTAMINES

Name of drug: ____________________

Usual dosage: ____________________

What it is used for: ____________________

Side effects: ____________________

____

____

____

E. ANALGESICS

Name of drug: ____________________

Usual dosage: ____________________

What it is used for: ____________________

Side effects: ____________________

____

____

____

Teacher Supplement 1

F. DIURETICS

Name of drug: ______________________________

Usual dosage: ______________________________

What it is used for: ______________________________

Side effects: ______________________________

____

____

____

G. ANTIPYRETICS

Name of drug: ______________________________

Usual dosage: ______________________________

What it is used for: ______________________________

Side effects: ______________________________

____

____

____

H. ANTIDEPRESSANTS

Name of drug: ______________________________

Usual dosage: ______________________________

What it is used for: ______________________________

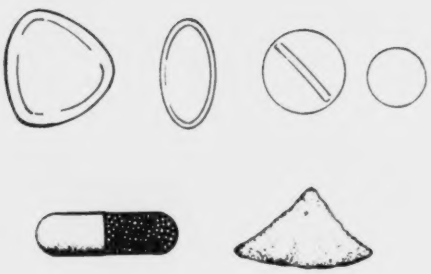
Side effects: ______________________________

____

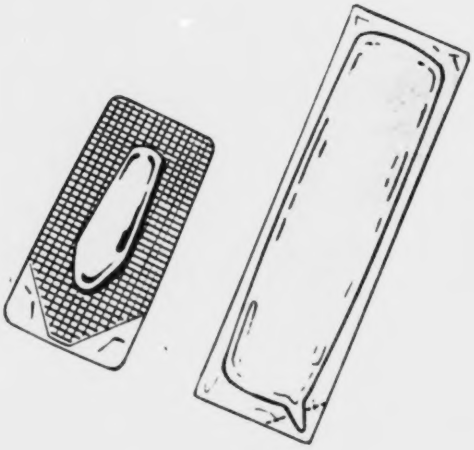
____

____

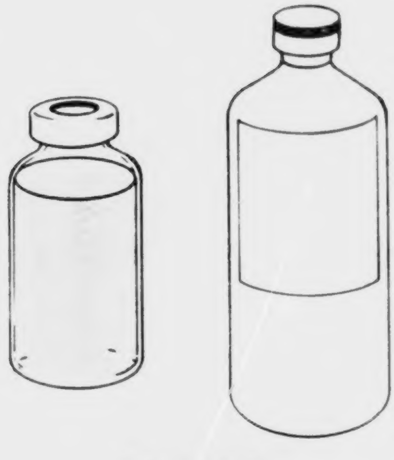
Forms of Drugs



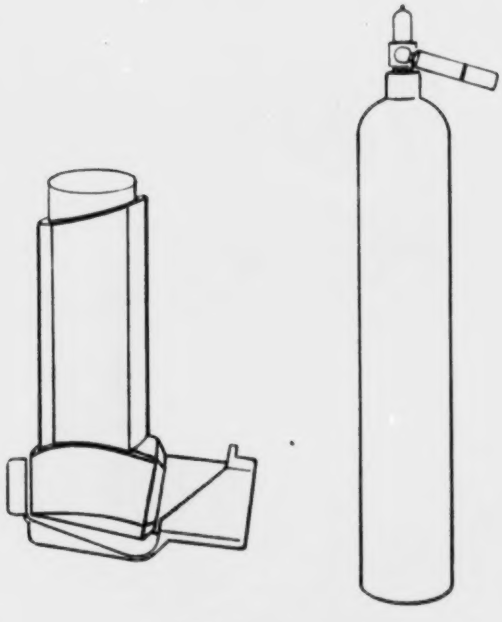
Solids



Semi-Solids

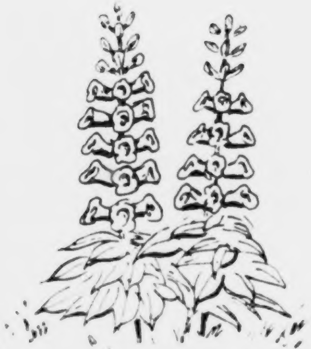


Liquids



Gases

Sources of Drugs

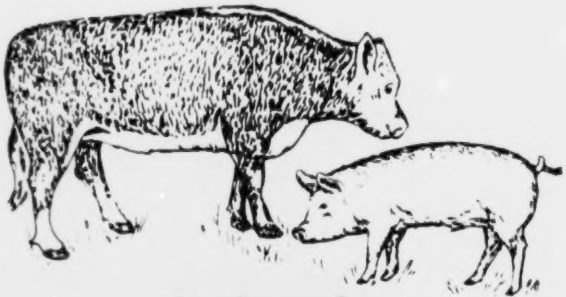


Plants

Example: The drug digitalis is obtained from the purple foxglove plant.

Minerals

Example: Iron is used to treat anemia.



Animals

Example: Insulin from the pancreas of a cow or pig may be used to treat diabetes.

Synthetic

Example: Penicillin is produced in the laboratory to treat bacterial infections.

Pharmacologic Agents
Unit 2-E

Information Sheet

1. **Terms and definitions**

   a. **Antagonist** — Counteracts the action of something else

   b. **Capsule** — Gelatin-type container that encloses a single dose of a drug

   Note: The capsule prevents the patient from tasting the drug.

   c. **Dermal patch** — Skin patch containing the drug which is absorbed through the skin, thus promoting a consistent blood level between application times

   d. **Dosage** — Amount of medicine to be administered to a patient at one time

   e. **Drug** — Any chemical substance taken into the body for the purpose of affecting body function

   f. **Emulsion** — Liquid drug preparation which contains droplets of oil and fat in water

   g. **Food and Drug Administration (FDA)** — Federal agency that enforces regulations concerning the manufacture and distribution of food, drugs, and cosmetics

   h. **Hypodermic or subcutaneous** — Beneath the skin

   i. **Inflammation** — Body's defense response of living tissue to injury; symptoms include pain, heat, swelling, and impaired function of affected area

   j. **Inhalant** — Medication or substance which is administered by inhaling

   k. **Inhale** — To draw in breath; to inspire

   l. **Intradermal** — Within the skin

   m. **Intramuscular** — Within a muscle

   n. **Intravenous** — Within a vein

   o. **Local** — Limited to or pertaining to one part or place

   p. **Lozenge (troche)** — Tablet containing flavoring; indicated for a local effect on the throat or mouth

Information Sheet

q. **Malignant hyperthermia** — Potentially fatal complication of anesthesia characterized by a rapid rise in temperature and muscle rigidity, especially of the jaw

Note: A temperature as high as 117°F has been recorded, but 111.2°F is probably the highest with survival.

r. **Oxidized cellulose** — Plant fiber that has been combined with oxygen and made to resemble cotton or gauze; used to arrest bleeding by direct application to site of hemorrhage

s. **Parenteral** — Designating any route other than the alimentary canal

t. **Paresthesia** — Abnormal sensation such as burning, prickling, "crawling," or feeling of insects crawling over the skin

u. **Pharmacist** — Person licensed to prepare and dispense drugs

v. **Pharmacopeia** — Book containing a selected list of medicinal preparations and their dosage forms; provides a description and the standards for purity and strength for each drug listed

w. **Pharmacy** — Profession or place of preparing and dispensing drugs

x. **Prescription** — Physician's medication order

y. **Prophylactic** — To ward off or to prevent infection and disease

z. **Solution** — Liquid containing a dissolved substance

aa. **Styptic** — Agent that checks hemorrhage by causing the blood vessels to contract

bb. **Sublingual** — Beneath the tongue

cc. **Suppositories** — Semi-solid substance which serves as a vehicle for medicines to be absorbed by the rectum, vagina, or urethra

dd. **Suspension** — Liquid form of medication that must be shaken well before using because the drug particles are not evenly dissolved in the liquid

ee. **Systemic** — Generalized or affecting the entire body

ff. **Tablet** — Compressed mixture of a pure drug into a solid form; may be in a variety of shapes and colors

gg. **Tincture** — Solution which contains alcohol as the primary solvent

Information Sheet

hh. **Topical** — Pertaining to a particular area; local application, never injected

ii. **Vasoconstriction** — Narrowing of blood vessels

jj. **Volatile** — Easily vaporized or evaporated

2. **General purposes of drugs**

a. Diagnosis

Example: Contrast media to outline internal organs in order to detect obstructions, strictures, or abnormalities

b. Treatment of symptoms

Examples: Analgesics to relieve pain
Antipyretics to decrease temperature
Local anesthetics to relieve or prevent pain

c. Treatment of diseases or dysfunctions

Examples: Antibiotics taken internally for specific infections
Topical ointments for dermatitis
Hormone therapy such as insulin for diabetes mellitus

d. Prevention of disease

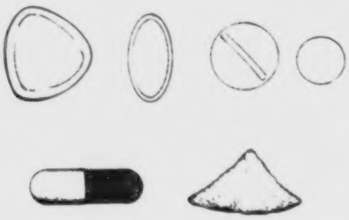
Examples: Vaccines such as for polio
Serums such as gamma globulin
Antitoxins such as for diphtheria or tetanus

3. **Forms of drugs**

a. Solids

Examples: Tablets, capsules, lozenge (troche), powders

Figure 1

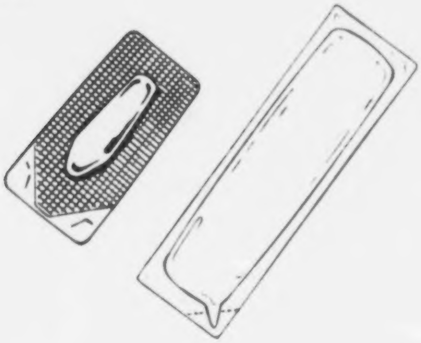


Information Sheet

b. Semi-solids

Examples: Ointments, creams, gels, dermal patches, suppositories

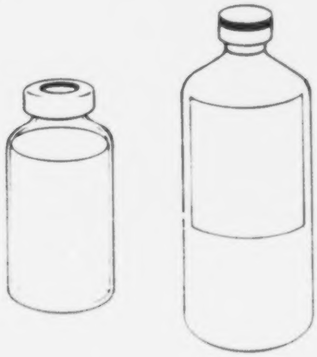
Figure 2



c. Liquids

Examples: Tinctures, solutions, suspensions, emulsions

Figure 3



Information Sheet

d. Gases

Examples: Inhalants, nasal sprays, anesthetic gases

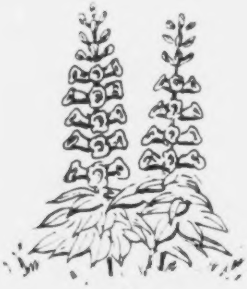
Figure 4

4. Sources of drugs

a. Plants

Examples: Digitalis from purple foxglove, castor oil from castor beans, iodine from kelp or seaweed, morphine or codeine from the white poppy, vincristine (chemotherapeutic agents) from periwinkle plants

Figure 5



Information Sheet

b. Minerals

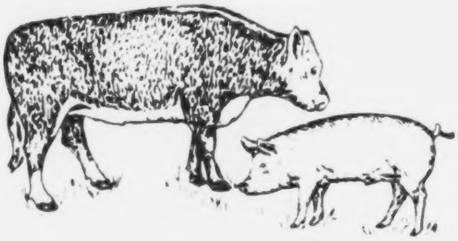
Examples: Sulfur, iron, magnesium, potassium, silver, gold

Figure 6

c. Animals

Examples: Thyroid extract, insulin, cortisone, growth hormone

Figure 7



d. Synthetic (or pharmaceutical)

Examples:
Antibiotics — Streptomycin, penicillin
Sulfa drugs — Gantrisin, sulfadiazine
Synthetic hormones — Cortisone, prednisone, progestin, liothyronine sodium (thyroid replacement)
Hypoglycemics — Tolbutamide, chlorpropamide

Note: Genetic engineering (recombinant DNA technology) is now being used to synthetically mass produce some previously rare or expensive drugs such as human insulin and human growth hormones.

Figure 8

Information Sheet

5. **Types of names that a drug may have**

   a. **Chemical name**

      (1) Exact chemical formula of the drug

      (2) Usually long and difficult to pronounce and of no concern to the health care worker

      Note: The first letter is not capitalized.

   b. **Generic name**

      (1) Common name assigned to the drug when it is ready to be marketed

      (2) May be used in all countries, by any manufacturer

      Note: The first letter is not capitalized.

   c. **Brand name or trade name**

      (1) Name by which a pharmaceutical company identifies its product; is copyrighted and used exclusively by that company

      (2) Makes pronunciation and spelling easier

      (3) The symbol ® is used behind the name to indicate it is a "registered" trademark.

      Note: The first letter is capitalized.

      Examples: Chemical name — tetracycline hydrochloride
      Generic name — tetracycline
      Brand names —Achromycin®, Tetracyn®, Panmycin®

6. **Drug information resources**

   a. *Physician's Desk Reference (PDR)*

      (1) Annual publication which is one of the most widely used references for drugs

      (2) Contains information concerning drugs, primarily prescriptions and diagnostic products

Information Sheet

b. *United States Pharmacopeia/Dispensing Information (USP/DI)*

   (1) Annual publication which provides drug information for the physician

   (2) Contains up-to-date information on the ability of drugs to cause cancer

c. *American Hospital Formulary Service Drug Information (AHFS)*

   (1) Annual publication distributed to practicing physicians

   (2) Contains easy-to-read, concise information

7. Common classes of drugs used in surgery and their actions

Note: There are other classes of drugs, but these are the more common ones that will be used in surgery.

a. Adrenergic — Stimulates nerve fibers to release epinephrine

b. Analgesic — Relieves pain

c. Anesthetic — Produces loss of feeling

d. Antibiotic/anti-infective — Destroys bacteria and other pathogenic microorganisms

e. Anticholinergic — Inhibits the parasympathetic responses; manifested by drying up of body secretions

f. Anticoagulant — Prevents or delays blood coagulation

g. Antidote — Prevents or counteracts the action of a poison

h. Antihistamine — Neutralizes the action of histamine in the body; frequently used in the treatment of allergies or allergic reactions

i. Anti-inflammatory — Counteracts or diminishes inflammation or its effects

j. Antipyretic — Reduces fever

k. Antispasmodic — Reduces the passing of impulses of autonomic nervous system; stops flow of secretions and gastric and bladder contractions

l. Cardiogenic — Acts directly on the heart

m. Depressant — Reduces a body function or nerve activity

Information Sheet

n. Diuretic — Increases the output of urine

o. Hemostatic — Slows flow of blood

p. Hormone — Substance originating in an organ or gland which is carried by the bloodstream to its target organ; stimulates organ by chemical action to increase activity or to secrete another hormone

q. Hypnotic — Induces sleep; causes insensibility to pain

r. Muscle relaxant — Relieves muscular tension

s. Narcotic — Produces sleep; relieves pain; stronger than a hypnotic

t. Oxytocic — Stimulates uterine contractions

u. Sedative — Quiets and relaxes, but does not produce sleep

v. Tranquilizer — Suppresses mental tension and anxiety

w. Vasoconstrictor — Constricts blood vessels

x. Vasodilator — Dilates blood vessels

y. Vitamin — Regulates or participates in normal metabolism, growth, and development of the body

8. **Characteristics of anticoagulants**

a. Are used to prolong the clotting of blood

b. Are frequently used during cardiovascular procedures

c. Prevent clot formation around vessels when used as an irrigating solution in the surgical wound

d. Prevent thrombosis (an obstructing clot within the circulatory system) when given intravenously to the patient

e. The most common anticoagulant used is heparin sodium.

Information Sheet

f. Heparin comes in various concentrations.

Examples: 10 USP Units Heparin / ML
100 USP Units Heparin / ML

Available in Tubex sterile cartridge needle units:

1,000 USP Units / ML
5,000 USP Units / 0.5 ML
10,000 USP Units / ML

Note: The dosage and concentration of heparin will vary according to the surgeon's preference. Care must be taken to obtain correct dosage needed.

g. A heparinized saline irrigating solution, usually 5000 units in 500 ml of normal saline, may be used.

h. The principal post-op complication of anticoagulant therapy is spontaneous bleeding.

i. The antagonist for heparin is protamine sulfate which is kept in the refrigerator.

Note: Protamine sulfate is an anticoagulant when given alone; however; it acts as a coagulant when given following heparin.

9. Characteristics of hemostatic agents

a. Are used to promote blood coagulation when there is excessive bleeding (such as during surgery) and when standard methods of hemostasis (such as clamping, ligating, electrosurgery) are not effective.

b. Hemostatic agents may be administered systemically or applied topically to the bleeding site.

c. Hemostatic agents administered systemically include:

(1) Calcium gluconate, calcium chloride, calcium lactate—Calcium salts are needed for the reactions in blood coagulation.

(2) Vitamin K (Mephyton® or Aquamephyton®)—Needed for normal blood coagulation

(3) Protamine—Heparin antagonist; used for treatment of heparin overdose

d. Hemostatic agents administered topically include thrombin, Gelfoam®, Gelfilm®, Avitene®, Surgicel®, Oxycel®, and Helistat®.

Information Sheet

e. Thrombin

  (1) Is a dry powder which is dissolved in sterile saline solution

  (2) Establishes clotting on bleeding surfaces of delicate tissue

  (3) Thrombin is **never** injected; used only for topical application.

  (4) Is kept in the refrigerator

  (5) May be used in conjunction with other topical hemostatic agents to control surgical bleeding

  Example: Pieces of Gelfoam® soaked in thrombin

  (6) Solutions ranging in concentration from 100 units/ml to 2000 units/ml may be used.

f. Gelfoam®

  (1) When applied onto bleeding tissue, flow of blood is quickly stopped.

  (2) Is an absorbable gelatin sponge available in different sizes

  (3) May be moistened with saline solution, thrombin, or epinephrine solution before it is placed on a bleeding surface

  (4) Can be left in surgical wounds, and is completely absorbed in 4-6 weeks

g. Gelfilm®

  (1) Used in neuro, thoracic, and ophthalmic surgery to cover defective tissue and to prevent bleeding

  (2) Similar to Gelfoam®, but has a cellophane-like appearance in the dry state and a soft, elastic consistency when moistened

  (3) Absorbed by tissue after implantation

h. Avitene®

  (1) Is a microfibrillar collagen preparation

  (2) Promotes clotting by attracting platelets which then release clotting factors

  (3) Used to control capillary bleeding

Information Sheet

(4) Is **not** used for injection, only for topical application

(5) Is available in a powdery, dry snow-like form and in a compacted nonwoven web sheet

(6) General considerations:

  (a) Before applying **dry** product, surgeon blots surface to be treated with dry sponge.

  (b) Dry smooth forceps are used to handle Avitene® because it will adhere to wet gloves or instruments.

  (c) Avoid spilling on nonbleeding surfaces. Avitene® should only be applied to source of bleeding.

  (d) Discard any unused portion. Do not reautoclave.

  (e) Surgeon removes any excess material after a few minutes.

i. Surgicel® and Oxycel® (oxidized cellulose)

  (1) Are absorbable hemostatic agents

  (2) Are used as sterile packing materials at surgical sites to control bleeding

  (3) Act by absorbing blood and forming an adhesive mass which stops bleeding

  (4) Surgicel® is available in a variety of sizes in a gauze form.

  (5) Oxycel® is available in two forms—cotton and gauze.

  (6) Excess material should be removed from bleeding site.

j. Helistat®

  (1) Soft, pliable, absorbable collagen hemostatic sponge

  (2) Available in various sizes

  (3) Applied **dry** to bleeding surface

  (4) Must be kept **dry**, and should be applied with **dry** gloves and instruments

  (5) Excess should be removed prior to wound closure

Information Sheet

k. Other hemostatic methods

  (1) Phenol (carbolic acid) and alcohol

    (a) Phenol may be used to cauterize tissue.

    Example: Phenol applied to lumen of the appendix or gastrointestinal tract

    (b) Phenol is very destructive to living tissue and can cause severe burns.

    (c) Alcohol neutralizes action of phenol.

    (d) After surgeon applies phenol, the burning action continues until alcohol is applied.

  (2) Styptics

    (a) Epinephrine is used as a vasoconstrictor to decrease bleeding.

    Example: Gelatin sponges soaked in 1:1000 epinephrine applied to bleeding surfaces

    (b) Silver nitrate is used topically as an astringent and an antimicrobial, most commonly in the treatment of burns.

    (c) Tannic acid is used occasionally on mucous membranes of the nose and throat to help stop capillary bleeding.

10. Characteristics of antibiotics/anti-infectives commonly used in surgery

a. Are used to destroy or inhibit the growth of pathogenic microorganisms

b. May be used as an irrigating solution or given intravenously

c. Are available in various forms such as powders and ointments

d. Most antibiotics/anti-infectives are categorized in large classes such as penicillins, aminoglycosides, cephalosporins, tetracyclines, as well as others.

e. Common antibiotics used in surgery include:

  (1) Penicillin G potassium—For moderate to severe systemic infections caused by numerous bacteria

Information Sheet

(2) Kanamycin sulfate (Kantrex®)—For serious infections caused by *Escherichia coli* and organisms resistant to other antibiotics

Note: One gram of kanamycin sulfate is frequently mixed with 50,000 units of bacitracin for surgery.

(3) Cephalosporins (such as Kefzol®, Ancef®, Cefadyl®, and Keflin®)—For serious infections of the respiratory and genitourinary tracts, skin and soft tissue infections, bone and joint infections, and septicemia

(4) Polymyxin B sulfate (Aerosporin®)—Used topically and in combination with other anti-infectives or steroids for infections of the eye, ear, mucous membranes, and skin

(5) Bacitracin—Used topically for infections caused by various bacteria; is available in powder or ointment form

(a) Bacitracin powder, kept in the refrigerator, should be dissolved in saline solution, and used topically as an irrigating solution; **never** injected.

(b) Bacitracin ointment is designed to be placed directly in the wound and does not need to be refrigerated.

f. Many topical anti-infective products are available as ointments and sprays (such as Neosporin® and Sterispray®) which can be used in surgery to protect the wound later after it is sutured.

Note: There are many other specific antibiotics that you will encounter in surgery in addition to the ones mentioned here.

11. Characteristics of narcotic analgesics

a. Are primarily used to relieve pain

b. Are capable of causing dependence with regular use. These are classified as controlled substances by the federal government.

c. According to federal laws, narcotic medications must be kept in a locked cabinet and must be signed out when used. A narcotic log book is commonly used to account for the correct number of drugs available at all times.

d. In many hospitals, only registered nurses may obtain narcotics from the narcotic cabinet.

Information Sheet

e. Common narcotic analgesics used in surgery include:

  (1) Morphine sulfate—Very potent, addictive narcotic that raises the pain threshold, produces sedation, and depresses respirations

  (2) Meperidine hydrochloride (Demerol®)—Synthetic substitute for morphine sulfate that does not depress respirations as morphine does

  (3) Fentanyl citrate (Sublimaze®)—Used as an adjunct to general anesthesia to relieve pain and produce sedation; commonly used in short surgical procedures and as a preoperative and postoperative medication because of its short duration

  (4) Sufenta®— Used to maintain a balanced general anesthesia

  (5) Loradol®/Toradol®—Nonsteroid antiflammatory drug that may be used for short-term pain relief

  (6) Cocaine hydrochloride—Used in surgeries on the respiratory tract to reduce bleeding and to shrink mucous membranes

    (a) Administered topically, **never injected**, because of its high toxicity

    (b) Available in liquid and capsule forms

      - Liquid form is tinted blue for easier identification; available in 5% and 10% strengths.

      - Capsule is available in 250 mg/capsule.

f. Adverse effects to narcotic analgesics include respiratory depression, nausea, and vomiting.

g. Narcotic antagonists such as naloxone (Narcan®) or levallorphan tartrate (Lorfan®) should be on hand to reverse the depressant effects of narcotics if needed.

12. Characteristics of diuretics

a. Draw fluid away from tissues and into the urinary system

b. In surgery, diuretics are commonly used to reduce intraocular or intracranial pressure.

c. Diuretics commonly used in surgery include:

  (1) Mannitol (Osmitrol®)

  (2) Furosemide (Lasix®)

Information Sheet

13. **Characteristics of steroids**

    a. Are commonly used in surgery to reduce tissue inflammation and post-operative swelling

    b. Steroids are particularly useful in cardiovascular, ophthalmic, and plastic surgery.

    c. Common steroids include:

        (1) Betamethasone (Celestone®)

        (2) Dexamethasone (Hexadrol®, Decadron®)

        (3) Hydrocortisone sodium succinate (Solu-Cortef®)

        (4) Methylprednisolone sodium succinate (Solu-Medrol®)

14. **Characteristics of oxytocics**

    a. Are used to contract the uterus

        (1) Are used in obstetrics to induce labor

        (2) Are used in surgery to expel uterine contents (blood clots, placenta remnants) after a cesarean section or therapeutic abortion

    b. Commonly used oxytocics include:

        (1) Synthetic oxytocin injection (Oxytocin®, Pitocin®, Syntocinon®, Uteracon®)

        (2) Methylergonovine maleate (Methergine®)

15. **Characteristics of contrast media**

    a. Are radiopaque dyes used to outline various structures through x-ray

       Note: Since they are radiopaque, they appear white on x-ray.

    b. Commonly used in biliary surgery to determine the presence of stones, which appear as dark spots against the white contrast media.

    c. Commonly used in cardiovascular and gastrointestinal surgery to identify strictures.

Information Sheet

d. Common contrast media include:

  (1) Meglumine diatrizoate (Cardiografin®)—Used for radiography of the heart and major blood vessels

  (2) Iodipamide (Cholografin®)—Used for radiography of the biliary system

  (3) Diatrizoate sodium (Hypaque®, Renografin®)—Used for radiography of the biliary tract, kidney, and other internal structures

  (4) Diatrizoate meglumine (Cystografin®)—Used for radiography of the urinary tract

  (5) Iohexol (Omnipaque®)—Used for radiography of the female reproductive organs and for viewing overall body structures such as brain, spinal cord, liver, pancreas, kidneys, aorta, and blood vessels

  (6) Hyskon®—Clear, viscid, sterile fluid used with the hysteroscope as an aid in distending the uterine cavity

  Note: Hyskon® has the tendency to crystalize when subjected to temperature variations or stored for long periods of time. To dissolve the crystal formations, heat bottles at 100 - 110 degrees C.

16. Characteristics of dyes used in surgery

a. Are solutions that stain tissue

  (1) Are used in colored marking pens to indicate incisional lines

  (2) Are used in various diagnostic procedures (such as on the urinary tract to stain the urine)

  (3) Are used to determine if internal structures are patent (open)

  (4) Occasionally are used topically as fungicides or anti-infectives

b. Common dyes include:

  (1) Methylene blue — Used as a stain for marking the skin and also for urinary diagnostic procedures; may also be used to determine fallopian tube patency

  (2) Indigo carmine — Colored solution for tracking fissures, fistulas, and determining the patency of structures (such as fallopian tubes)

  (3) Brilliant green — Used as a stain for marking the skin

Information Sheet

(4) Gentian violet — Used as a stain for marking the skin; is **never** used for injection

(5) Lugol's solution (strong iodine) — Used to stain cervical tissue

Note: Schiller's test uses iodine to test for cervical cancer.

17. Characteristics of intravenous solutions, blood replacements, and blood substitutes

a. Patients scheduled to receive a general anesthetic will have an intravenous solution started when they come to the OR (if not before).

b. The intravenous route allows the surgical team (particularly the anesthesiologist) a convenient and efficient method for administering drugs and anesthetic agents as well as blood replacements and substitutes if needed.

c. Intravenous solutions are commonly used to restore blood volume and compensate for fluid loss.

d. Common intravenous solutions include:

(1) Normal saline solution (also called sodium chloride solution, NaCl) is the most common intravenous solution.

Note: Normal saline solution designed for intravenous infusion should not be confused with normal saline solution designed for irrigation. Although these contain the same mixture, they are packaged differently.

(2) Dextrose solution (in saline or distilled water) is used for those patients requiring an easily metabolized source of calories.

(3) Lactated Ringer's solution is a physiologic salt solution that may be used to replenish the patient's supply of electrolytes (sodium, calcium, and potassium), to improve circulation, or to stimulate renal activity.

(4) Plasmalyte® is an electrolyte balanced solution which is compatible with the pH of blood.

e. Blood replacements and substitutes are commonly given intravenously for patients having a significant blood loss.

(1) Blood replacements include whole blood, plasma, packed blood cells, and platelets.

Note: Almost anything that whole blood can be broken down to can be available as a blood replacement.

Information Sheet

(2) Blood substitutes include:

(a) Dextran® is an artificial plasma-volume expander which is especially valuable in treating shock resulting from hemorrhage.

(b) Normal serum albumin and plasma protein fraction are both used to treat shock resulting from hemorrhage and to combat hypoproteinemia. They act to supply colloid to the blood and expand plasma volume.

18. Miscellaneous drugs used in surgery for emergency situations

a. Aminophylline or theophylline ethylenediamine (Aminophyllin®) — A spasmolytic that is used to treat acute and chronic bronchial asthma, bronchospasm, pulmonary emphysema, Cheyne-Stokes respiration, and pulmonary edema

b. Atropine sulfate — A drug used to treat bradycardia and bradyarrhythmia; also given preoperatively to dry secretions

c. Dantrolene® — A muscle relaxant given for treatment of malignant hyperthermia

d. Digitoxin (Purodigin®) — A drug that acts directly on the myocardium used to treat congestive heart failure, atrial tachycardia, and atrial fibrillation and flutter; used to slow the heart rate and to strengthen contractions

e. Diphenhydramine hydrochloride (Benadryl®) — A sedating antihistamine used with epinephrine to treat anaphylaxis

f. Epinephrine (Adrenalin®, Sus-Phrine®, Epifrin®) — An adrenergic used as a vasoconstrictor, as a cardiac stimulant, and to relax bronchioles; used to treat anaphylactic reactions, asthmatic attacks, and local hemorrhaging; also used to prolong the action of local anesthetics

g. Lidocaine hydrochloride (Xylocaine®) — An antiarrhythmic used to treat ventricular arrhythmias or ventricular tachycardia; also used as a local anesthetic agent

h. Norepinephrine injection (Levophed®) — An adrenergic used to restore blood pressure in acute hypotensive states

i. Papaverine® — Vasodilator drug used to dilate small vessels for surgical procedures such as AV shunt or fistula or femoral-popliteal bypass

j. Potassium — An electrolyte which can cause a cardiac irritability if a deficiency is present

k. Sodium bicarbonate — An alkalinizer used to treat metabolic acidosis, especially during cardiac arrest

Information Sheet

19. Abbreviations pertaining to the handling of medications

ABBREVIATION	MEANING	ABBREVIATION	MEANING
$\overline{aa}$	of each	OD	right eye
ad	to, up to	OU	both eyes
amp	ampule	OS	left eye
aq	water	os	mouth
aq dest	distilled water	oz	ounce
cap	capsule	per	through, by
$\bar{c}$	with	po, per os	by mouth
cc	cubic centimeter	pil	pill
comp	compound	pre-op	preoperative
DC	discontinue	prn	as needed
ext	extract	q	every
Fe	iron	qh	every hour
Fld or *f*	fluid	qs	quantity sufficient
gm	gram	R	rectal
gtt	drops	Rx	take
H, hypo	hypodermic	$\bar{s}$	without
h	hour	sc, subcu	subcutaneous
IM	intramuscular	sol	solution
IV	intravenous	sp	spirit
L	liter	$\overline{ss}$	one-half
liq	liquid	stat	at once
mg	milligram	tr, tinc	tincture
ml	milliliter	u, U	unit
ol	oil	ung	ointment

20. Care and handling of medications

a. Only registered nurses or physicians can legally distribute medications to surgical technologists.

b. Surgical technologists **never** administer medications to patients. However, they will be involved in the preparation and handling of medications during a surgical procedure.

c. The surgical technologist is involved in preparing mixtures of drugs on the back table after proper cross-referencing with the circulator (registered nurse) and in obtaining certain medications for the surgeon intraoperatively.

d. Medication should **never** be accepted from vials that are cracked or chipped.

e. Medications should **never** be accepted that appear discolored or suspicious.

f. **Never** use drugs if you are in doubt about the identification of the drug.

Information Sheet

g. Do not accept a medication from a vial or bottle you have not read.

h. **Never** use outdated medications. The composition and effect of the drug may be altered.

i. Label all medications on sterile back table, both in containers and syringes.

j. If medications are unlabeled and you are uncertain or have forgotten which basins contain which drugs, discard them all and request that new medications be distributed.

k. It is the responsibility of both the circulating nurse and the scrubbed technologist to make certain that the correct drug, correct amount, and correct strength is administered.

l. Keep track of how much irrigation solution is used within the wound so that blood loss can be determined.

21. **Procedure for the surgical technologist to accept medications from the circulator**

a. Surgeon determines if medication will be needed by:

   (1) Directly informing the surgical team, or

   (2) The medication dosage and mixture concentrations will be listed on the doctor's preference card or computerized list of materials.

b. Circulator obtains medication and shows bottle to the technologist. The nurse must distribute the drug in a manner that allows the technologist to see the name and understand the amount of drug being received.

c. Technologist recites **aloud** the drug's name, amount, strength, and expiration date.

d. Nurse distributes the drug to the technologist. Technologist is within the sterile field.

e. Circulator shows medication vial to technologist again.

f. Technologist mentally notes the drug's name, amount, and strength.

g. Technologist labels the medication with the name and strength.

h. Circulator leaves the empty medication bottle in the room so that if there is any doubt, the surgeon can see the bottle.

i. Once the technologist receives the medication, it is his/her responsibility to pass the right medication in the strength specified by the surgeon on the surgical field.

j. The surgical technologist is responsible for informing the surgeon of all medications and mixtures as the drug is passed intraoperatively.

Pharmacologic Agents
Unit 2-E

Student Supplement 1—Review Pharmacology in Multiple-Choice Format

Name ______________________________ Date ______________

Directions: Circle the letter of the correct answer.

1. An anticholinergic drug given pre-operatively to inhibit mucous secretions is:

   a. Demerol®
   b. Talwin®
   c. Atropine®
   d. Narcan®

2. Another name for Adrenalin® is:

   a. Epinephrine
   b. Ephedrine
   c. Aramine
   d. Ketamine

3. A drug that prevents blood clot formation is called a/an:

   a. Antibiotic
   b. Coagulant agent
   c. Oxytocic
   d. Anticoagulant

4. How many milliliters are in one ounce?

   a. 15
   b. 30
   c. 50
   d. 100

5. The abbreviation q means:

   a. Subcutaneous
   b. Quantity sufficient
   c. Every hour
   d. Every

6. An osmotic diuretic agent used in neurosurgery to reduce cerebral edema is:

   a. Sublimaze®
   b. Mannitol
   c. Adrenalin®
   d. Pitocin®

Student Supplement 1

7. Which medication may be injected as a local anesthetic?

    a. Cocaine
    b. Lidocaine
    c. Meperidine
    d. Thrombin

8. Dr. Doe, an ENT surgeon, uses 500 mg. of cocaine capsules, for her septorhinoplasty. When obtaining the drug from the narcotic cabinet, the registered nurse must sign for the drug. How many capsules will she need to obtain?

    Note: One cocaine capsule is equal to 250 mg.

    a. 1 capsule
    b. 2 capsules
    c. 1½ capsules
    d. 4 capsules

9. What is the action of Lasix®?

    a. Anti-inflammatory
    b. Diuretic
    c. Depressant
    d. Contrast media

10. The hemostatic agent that is a dry powder (kept in refrigerator) mixed with saline and used only topically is:

    a. Gelfoam®
    b. Avitene®
    c. Thrombin
    d. Heparin

11. The drug, _______, should be on hand to reverse the depressant effects of narcotics if needed.

    a. Morphine sulfate
    b. Bacitracin
    c. Neosporin®
    d. Narcan®

12. A vasoconstricting drug which, when added to a local anesthetic agent, extends its life and helps to control bleeding is:

    a. Ephedrine
    b. Epinephrine
    c. Ethrane
    d. Cocaine

Student Supplement 1

13. Another name for kanamycin is:

    a. Carbolic acid
    b. Kantrex®
    c. Neomycin®
    d. Vitamin K

14. Heparin is a/an:

    a. Narcotic
    b. Anticoagulant
    c. Coagulant
    d. Oxytocic

15. A drug used as a local anesthetic, but also used as a myocardial depressant is:

    a. Papaverine®
    b. Bacitracin
    c. Cocaine
    d. Xylocaine®

16. Another name for carbolic acid is:

    a. Avitene®
    b. Pitocin®
    c. Phenol
    d. Alcohol

17. An anticoagulant given for its antagonistic effect on heparin is:

    a. Dicumarol®
    b. Coumadin®
    c. Protamine sulfate
    d. Diazide

18. A specially treated form of surgical gauze or cotton that has a hemostatic effect when buried in tissue is:

    a. Topical thrombin
    b. Gelfoam®
    c. Pitocin®
    d. Oxycel®

19. An electrolyte which can cause a cardiac irritability if a deficiency is present is:

    a. Calcium
    b. Vitamin C
    c. Sodium
    d. Potassium

20. A drug frequently given for allergic reactions is:

    a. Antidepressant
    b. Antiflammatory
    c. Antihistamine
    d. Antispasmodic

21. The correct abbreviation which means at once is:

    a. stat
    b. prn
    c. IV
    d. IM

22. The correct abbreviation for "without" is:

    a. $\overline{s}$
    b. $\overline{c}$
    c. $\overline{ss}$
    d. h

23. When using the hemostatic agent Avitene®, always use pick-ups which are:

    a. Long
    b. Dry
    c. Short
    d. Wet

24. The principal post-operative complication of anticoagulant therapy is:

    a. Spontaneous bleeding
    b. Production of emboli
    c. Increased metabolism
    d. Thrombophlebitis

25. When a contrast medium is used in biliary surgery, stones present in the ducts appear:

    a. Dark
    b. Light
    c. Usually gray
    d. Do not appear if bubbles are present in the medium

26. The hemostatic agent which is an absorbable gelatin sponge that may be moistened with saline solution or thrombin before it is placed on a bleeding surface is:

    a. Heparin
    b. Gelform®
    c. Avitene®
    d. Oxycel®

Student Supplement 1

27. An artificial plasma-volume expander is:

    a. Mannitol
    b. Dextran®
    c. Ringer's solution
    d. Plasmalyte®

28. An oxytocic drug used primarily after childbirth to stimulate the uterine to contract is:

    a. Pitocin®
    b. Atropine
    c. Epinephrine
    d. Papaverine®

29. What drug is utilized in an anaphylactic reaction?

    a. Atropine
    b. Aminophylline
    c. Azo Gantrisin®
    d. Adrenalin®

30. What is the reason for using cortisone?

    a. Anti-inflammatory
    b. Antibacterial
    c. Antihistamine
    d. Antidepressant

31. A vagolytic drug which is administered for treatment of sinus bradycardia and also used pre-operatively to inhibit secretions is:

    a. Avitene®
    b. Aramine®
    c. Anectine®
    d. Atropine

32. The most commonly used synthetic narcotic used for pre-operative injection and post-operative pain is:

    a. Demerol®
    b. Talwin®
    c. Narcan®
    d. Sublimaze®

Student Supplement 1

33. A steroid is a drug that causes:

    a. Sterility
    b. Reduced tissue inflammation
    c. Protection against infection
    d. A decrease in body fluids

34. A hemostatic agent used topically to help control capillary bleeding is:

    a. Thrombin
    b. Papaverine®
    c. Protamine sulfate
    d. Bacitracin

35. A vasodilator drug used to dilate small vessels for surgical procedures such as A-V shunts or fistulas or femoral-popliteal bypass is:

    a. Pontacaine
    b. Protamine sulfate
    c. Papaverine®
    d. Penicillin

36. Bacitracin powder should be dissolved in saline solution before using it. Bacitracin powder is kept in the:

    a. O.R. supervisor's office
    b. Drug cabinet
    c. Narcotics cabinet
    d. Refrigerator

37. The most common topical anesthetic agent used in ENT surgery is:

    a. Xylocaine®
    b. Marcaine®
    c. Cocaine
    d. Carbocaine

38. When handling a syringe of medication to the surgeon for a local anesthetic, the scrub nurse should:

    a. Ask the circulating nurse what solution he or she has
    b. Ask the circulator to show the vial to the surgeon
    c. Show the surgeon the vial that it came from
    d. State the kind and percentage of the solution

Student Supplement 1

39. The drug of choice to treat metabolic acidosis which occurs during a cardiac arrest is:

    a. Potassium chloride
    b. Calcium carbonate
    c. Sodium bicarbonate
    d. Calcium gluconate

40. Another name for Xylocaine® is:

    a. Lincocin®
    b. Lidocaine
    c. Lasix®
    d. Aramine®

Pharmacologic Agents
Unit 2-E

Student Supplement 2—Review Pharmacology in True or False Format

Name ______________________________ Date ______________

Directions: Circle T or F to indicate if the statement is true or false.

T F 1. Antibiotics/anti-infective medications may be used as an irrigating solution or given intravenously.

T F 2. Medications should never be accepted that appear discolored or suspicious or have an outdated expiration date.

T F 3. It is good practice to leave the empty medication bottle in the room, so if there is any doubt, the circulator can show the surgeon the bottle.

T F 4. Antibiotics such as Kantrex® and Keflin® are used to promote blood coagulation, especially when the standard methods of hemostasis are ineffective.

T F 5. The surgical technologist is responsible for informing the surgeon of all medications and mixtures as she/he passes them intraoperatively.

T F 6. Never use drugs if you are in doubt about the identification of the drug.

T F 7. Common steroid medications used in surgery are Celestone®, Hexadrol®, and Solu-Cortef®.

T F 8. Diuretics commonly used in surgery include Omnipaque® and Hypaque®.

T F 9. The hemostatic agent bacitracin is available in two forms - surgical gauze and cotton.

T F 10. Lugol's solution is given to surgical patients to reduce inflammation and post-operative swelling.

T F 11. Bacitracin ointment is an antibiotic ointment which is designed to be placed directly in the wound and does not need to be refrigerated.

T F 12. If you have forgotten or are uncertain about the identity of a drug on your back table, discard the solution and start over.

T F 13. The surgical technologist is involved in preparing mixtures of drugs on the back table and in obtaining certain medications for a surgeon intraoperatively.

T F 14. The surgical technologist often has to administer medications to the surgical patient.

Pharmacologic Agents
Unit 2-E

Student Supplement 3—Review Abbreviations

Name ______________________________ Date ________________

Directions: Write the abbreviation sign or symbol for the following:

1. Ointment ____________
2. Without ____________
3. Intravenous ____________
4. Hour ____________
5. Both eyes ____________
6. Cubic centimeter ____________
7. At once ____________
8. Every ____________
9. Mouth ____________
10. Intramuscular ____________
11. With ____________
12. By mouth ____________
13. Liter ____________
14. Right eye ____________
15. Discontinue ____________
16. Preoperative ____________
17. Milliliter ____________
18. Left eye ____________
19. Of each ____________
20. Take ____________

Pharmacologic Agents
Unit 2-E

Assignment Sheet 1—Classify Various Drugs According to Type

Name ______________________________ Overall Rating __________

Evaluation criterion	Rating
Drugs are properly categorized	______

Directions: Classify the following drugs on the left by matching them with the categories on the right. Categories may be used more than once.

	Drugs		**Categories**
______a.	Gelfoam®	1.	Adrenergic
______b.	Morphine sulfate	2.	Antibiotic/anti-infective
______c.	Methergine®	3.	Anticoagulant
______d.	Lasix®	4.	Antihistamine
______e.	Lactated Ringer's solution	5.	Blood substitute
______f.	Epinephrine	6.	Contrast media
______g.	Thrombin	7.	Diuretic
______h.	Kanamycin sulfate	8.	Dye
______i.	Keflin®	9.	Hemostatic agent
______j.	Narcan®	10.	Intravenous solution
______k.	Demerol®	11.	Narcotic analgesic
______l.	Pitocin®	12.	Narcotic antagonist
______m.	Mannitol	13.	Oxytocic
______n.	Methylene blue	14.	Steroid
______o.	Hypaque®	15.	Vasodilator

Assignment Sheet 1

Drugs

______p. Bacitracin

______q. Normal saline solution

______r. Solu-Cortef®

______s. Sublimaze®

______t. Kefzol®

______u. Heparin

______v. Gentian violet

______w. Renografin®

______x. Avitene®

______y. Penicillin

______z. Cocaine

______aa. Oxycel®

______bb. Papaverine®

______cc. Vitamin K

______dd. Indigo carmine

______ee. Aerosporin®

______ff. Surgicel®

______gg. Decadron®

______hh. Lugol's Solution

______ii. Dextran®

______jj. Benadryl®

Categories

1. Adrenergic
2. Antibiotic/anti-infective
3. Anticoagulant
4. Antihistamine
5. Blood substitute
6. Contrast media
7. Diuretic
8. Dye
9. Hemostatic agent
10. Intravenous solution
11. Narcotic analgesic
12. Narcotic antagonist
13. Oxytocic
14. Steroid
15. Vasodilator

Anesthesia
Unit 3-E

Objective Sheet

Unit Objective

After completing this unit, the student should be able to complete statements concerning preoperative medications, types of anesthetics, and various agents used to obtain anesthesia. The student should demonstrate these competencies by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to anesthesia with the correct definitions.
2. Complete statements concerning the ideal anesthetic agent.
3. Complete statements concerning the preanesthetic preparation of the patient.
4. Select purposes of preoperative medications.
5. Complete statements concerning the selection of preoperative medications.
6. Complete statements concerning classifications of premedications.
7. Select true statements concerning anesthesia.
8. Identify sites involved in the pathway of pain.
9. Distinguish among types of anesthetics.
10. Distinguish between methods of administering a general anesthetic.
11. List agents used for general anesthesia.
12. List the four phases of general anesthesia.
13. Match types of local or regional anesthetics with the correct descriptions.
14. List agents used for local or regional anesthesia.
15. Match other anesthetic techniques occasionally used with the correct descriptions.

Objective Sheet

16. Complete statements concerning the characteristics of muscle relaxant drugs.

17. Distinguish between types of muscle relaxants.

18. List supplemental agents used with anesthetic agents to accomplish anesthesia.

19. List narcotic antagonists used intraoperatively.

20. List possible complications of anesthesia.

21. Select true statements concerning malignant hyperpyrexia-malignant hyperthermia syndrome.

22. Distinguish among actions of the surgical team if cardiac arrest occurs on the operating room table.

23. Match OR anesthesia equipment used for delivering anesthetics with their correct descriptions.

24. Discuss the care of the anesthetized patient.

Anesthesia
Unit 3-E

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for students with special needs.

4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Pathway of Pain (Objective 8)
   TM 2—Spinal and Epidural Anesthesia (Objective 13)

5. Obtain films, videotapes, and other resources to supplement instruction of this unit. See ordering information in the Suggested Supplemental Resources section that follows.

6. Develop teaching plan. Adjust for different learning styles.

7. Make copies of Unit Evaluation Form, which follows the written test section.

Delivery and Application

8. Provide students with unit of instruction.

9. Discuss unit and specific objectives.

10. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

11. Discuss the student supplements. These could be used as homework assignments, daily practice exercises, or quizzes. Explain to students how you plan to evaluate the supplements, if at all.

Suggested Activities

Evaluation

12. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

13. Make copies of the written test. Add or modify test items as needed.

14. Give written test.

15. Compile written test scores on the Unit Evaluation Form. Include any additional assignments.

16. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Demonstrate or arrange for a demonstration of anesthesia equipment. Demonstrations by outside resource people can be very important in assisting students learn practical applications of technology (**science skills**).

2. Discuss the role of the surgical technologist during the induction of anesthesia, and in the case of an emergency complication such as cardiac arrest, shock, vomiting, or malignant hyperthermia. This activity reinforces **communication skills** and **problem-solving skills**.

3. Discuss the need to refrain from talking while a patient is being induced. Activities such as this encourage **creative thinking, problem-solving**, and **communication skills**.

4. Discuss the four stages of general anesthesia — induction, excitement, operative, and danger. This activity reinforces **communication skills** and basic **science foundation skills**.

5. Invite a representative from a local medical facility's anesthesiology department to talk to the class about new developments in their area and how their field interacts with surgical technology. Guest lectures reinforce **communication skills** and **career motivation skills**.

Suggested Activities

Resources Used in Developing This Unit

1. Asperheim, Mary Kaye. *Pharmacology: An Introductory Text*, 7th ed. Philadelphia: W. B. Saunders Company, 1992.
2. Atkinson, Lucy Jo. *Berry & Kohn's Operating Room Technique*, 7th ed. St. Louis: Mosby Year Book, 1992.
3. Clayton, Bruce D. *Basic Pharmacology for Nurses*, 10th ed. St. Louis: C. V. Mosby Company, 1992.
4. Fuller, Joanna. *Surgical Technology: Principles and Practice*. Philadelphia: W. B. Saunders Co., 1986.
5. Meeker, Margaret Huth and Jane C. Rothrock. *Alexander's Care of the Patient in Surgery*, 9th ed. St. Louis: Mosby Year Book, Inc., 1991.
6. Shannon, Margaret T. and Billie Ann Wilson. *Govoni & Hayes Drugs and Nursing Implications*, 7th ed. Norwalk, CT: Appleton & Lange, 1992.
7. Sheridan, Eleanor, H. Robert Patterson, and Edward Gustafson. *Falconer's the Drug, the Nurse, and the Patient*, 7th ed. Philadelphia: W. B. Saunders Co., 1985.
8. Spratto, George R. and Adrienne L. Woods. *RN Magazine's NDR-92: Nurse's Drug Reference*. New York: Delmar Publishers , Inc., 1992.

Suggested Supplemental Resources—Audiovisual materials

1. *Anesthesia*

   Available from:

   Films for the Humanities & Sciences - Health
   Education Video Catalogue
   PO Box 2053
   Princeton, NJ 08543-2053
   800-257-5126

2. *Post-Anesthesia Nursing: Guidelines for Care*

   Available from:

   AJN Company
   Educational Services Division
   555 West 57th Street
   New York, NY 10019-2961
   Fax: 212-586-5462
   800-CALL AJN

Suggested Activities

3. *Not Too Hot to Handle: Malignant Hyperthermia* - 1990

4. *Local Anesthesia: Implications for the Perioperative Nurse* - 1988

3 and 4 are available from:

Cine-Med Distribution Center
Davis & Geck
Video Library
PO Box 745
Woodbury, CT 06798
800-633-0004

Anesthesia
Unit 3-E

Answers to Student Supplements

Student Supplement 1

1. d
2. a
3. b
4. d
5. c
6. a
7. a
8. b
9. c
10. c
11. a
12. b
13. d
14. d
15. d
16. d
17. b
18. b
19. c
20. c
21. d
22. d
23. c
24. d
25. d
26. b
27. b
28. d
29. b
30. a

Student Supplement 2

1. F
2. T
3. F
4. T
5. T
6. T
7. F
8. T
9. T
10. F
11. F
12. T
13. T
14. F
15. F
16. T
17. T
18. F
19. T
20. T
21. T
22. T
23. T
24. F
25. T
26. F
27. F
28. T

Anesthesia
Unit 3-E

Answers to Written Test

1. a. 16
   b. 2
   c. 19
   d. 1
   e. 18
   f. 12
   g. 4
   h. 13
   i. 7
   j. 14
   k. 9
   l. 8
   m. 17
   n. 5
   o. 3
   p. 10

2. a. Patient
   b. Surgeon
   c. Anesthesiologist

3. a. Anesthesia
   b. (1) Anesthesia
      (2) Side effects
      (3) Ask questions
      (4) Allergies
      (5) Laboratory data, diagnostic studies
      (6) Preoperative medication
   c. NPO, vomiting
   d. 1

4. b, d, e, f

5. a. Anesthesiologist
   b. Any two of the following:

      (1) Physical condition
      (2) Emotional status
      (3) Age
      (4) Weight

   c. Either one of the following:

      (1) Degree of relaxation necessary
      (2) Anesthesiologist's own personal preference

Answers to Written Test

6. a. Cause
b. Do not counteract
c. Sedative
d. Antiemetic
e. Reduce
f. Decrease
g. Demerol®
h. Demerol®
i. Respiratory
j. Are, are
k. Decrease
l. Have little effect on
m. Increase
n. Robinul®

7. a. F
b. F
c. T
d. (1) T
(2) F
(3) T
(4) T
(5) T
(6) F
e. (1) F
(2) F
(3) T
(4) T
(5) F
(6) T

8. a. Cerebral cortex
b. Spinal cord
c. Subarachnoid space
d. Nerve endings

9. a. MAC
b. G
c. G
d. S
e. BA
f. L
g. S
h. S, R, L, MAC
i. R
j. L
k. L

Answers to Written Test

10. a. INT
    b. INH
    c. INT

11. a. Any three of the following:

        (1) Halothane (Fluothane®)
        (2) Enflurane (Ethrane®)
        (3) Isoflurane (Forane®)
        (4) Methoxyflurane (Penthrane®)
        (5) Nitrous oxide (N_2O)

    b. Any two of the following:

        (1) Thiopental sodium (pentothal sodium)
        (2) Thiamylal sodium (Surital®)
        (3) Methohexital sodium (Brevital®)
        (4) Propofol (Diprivan®)
        (5) Ketamine hydrochloride (Ketalar®, Ketaject®)

12. a. Induction
    b. Maintenance
    c. Emergence
    d. Recovery

13. a. 6
    b. 2
    c. 5
    d. 4
    e. 1
    f. 3
    g. 7

14. Any three of the following:

    a. Cocaine hydrochloride (cocaine)
    b. Procaine hydrochloride (Novocain®)
    c. Lidocaine hydrochloride (Xylocaine®)
    d. Tetracaine hydrochloride (Pontocaine®)
    e. Mepivacaine hydrochloride (Carbocaine®)
    f. Bupivacine hydrochloride (Marcaine®, Sensorcaine®)
    g. Hyaluronidase (Wydase®)

15. a. 1
    b. 2
    c. 2
    d. 1

Answers to Written Test

16. a. Do not
    b. Relaxation
    c. During
    d. Motor
    e. Eliminated
    f. Respiratory

17. a, b, d, f

18. Any four of the following:

    a. Morphine sulfate
    b. Fentanyl (Sublimaze®)
    c. Sufentanil citrate (Sufenta®)
    d. Alfentanil (Alfenta®)
    e. Meperidine hydrochloride (Demerol®)
    f. Diazepam (Valium®)
    g. Droperidol (Inapsine®)

19. Any two of the following:

    a. Naloxone hydrochloride (Narcan®)
    b. Nalbuphine hydrochloride (Nubain®)
    c. Butorphanol tartrate (Stadol®)
    d. Pentazocine hydrochloride (Talwin®)
    e. Burenorphine hydrochloride (Buhrenex®)

20. Any five of the following:

    a. Excitement
    b. Respiratory obstruction
    c. Bronchospasm or laryngospasm
    d. Vomiting and aspiration
    e. Damage to teeth or dental work
    f. Eye injury due to drying of cornea
    g. Reaction to drugs or blood transfusions
    h. Injury to nerves due to improper positioning
    i. Fluid and electrolyte imbalance
    j. Hypothermia
    k. Shock (neurogenic, secondary to trauma or hemorrhage)
    l. Cerebral complications:
        (1) Cerebral vascular accident
        (2) Convulsions
        (3) Delirium
    m. Cardiac arrest
    n. Malignant hyperthermia

Answers to Written Test

21. b, d, e, f, g

22.

a.	ST	f.	ST	k.	CN
b.	A	g.	ST	l.	CN
c.	A	h.	S	m.	ST
d.	S	i.	CN	n.	ST
e.	S	j.	CN		

23.

a.	5
b.	2
c.	3
d.	4
e.	1

24. Discussion should include: (in student's own words)

a. Patients must be positioned properly to avoid pressure points, compression of nerves, or interference of respirations or circulation to an extremity. DO NOT LEAN ON THE PATIENT DURING SURGERY.

b. Change patient's position slowly and gently to allow for adjustment of circulatory system.

c. Patients must be transferred to the carrier carefully and gently to avoid straining muscles and ligaments; the anesthesiologist protects the patient's neck and head.

d. Since hearing is the last sensation to succumb to anesthesia, OR personnel must be aware that surgical patients are very vulnerable to auditory stimuli. Avoid room noise and conversations.

Anesthesia
Unit 3-E

Written Test

Name ______________________________ Score ______________

1. Match the terms on the right with the correct definitions.

______a. Insertion of endotracheal tube

______b. Decrease of or insensibility to pain

______c. A part of the body is insensitive to pain; caused by an interruption of the sensory nerve pathways that supply the area

______d. Loss of memory

______e. Unconscious state due to narcotics

______f. Removal of endotracheal tube

______g. Person who assists the anesthesiologist or anesthetist

______h. Muscular twitching involving contiguous groups of muscle fibers

______i. Agent that produces anesthesia

______j. Lacking vigor or firmness; flabby

______k. Drug that counteracts the action of something else

______l. A registered nurse who has taken a two-year course in anesthesiology and is certified to administer anesthetics and work under supervision of the anesthesiologist

______m. Limited to one place or part

______n. A medical physician who is a specialist in the field of anesthesiology

______o. The absence of essentially all sensation

______p. Agent that prevents or relieves nausea and vomiting

1. Amnesia
2. Analgesia
3. Anesthesia
4. Anesthesia technician
5. Anesthesiologist
6. Anesthesiology
7. Anesthetic
8. Anesthetist
9. Antagonist
10. Antiemetic
11. Endotracheal
12. Extubation
13. Fasciculation
14. Flaccid
15. General anesthesia
16. Intubation
17. Local
18. Narcosis
19. Regional anesthesia

Written Test

2. Complete the following statements concerning the ideal anesthetic agent.

    a. For the __________________, the ideal anesthetic agent is rapid-acting, easily reversed, and provides analgesia extending into postoperative period.

    b. For the __________________, the ideal anesthetic agent produces good muscular relaxation and minimum side effects.

    c. For the __________________, the ideal anesthetic agent has a wide margin of safety, leaves the body unaltered, is potent, allows a high percentage of oxygen to be used, and has a low level of toxicity.

3. Complete the following statements concerning the preanesthetic preparation of the patient.

    a. Preoperative anesthesia assessment should be made by the __________________ representative before the scheduled surgery.

    b. The following tasks are performed during the preoperative visit:

        (1) Explain the effects of the __________________.

        (2) Inform the patient of possible __________________ __________________ and complications from the anesthesia.

        (3) Allow the patient to __________________ __________________ concerning his/her anesthetic care to alleviate possible fears.

        (4) Perform a brief history and physical on the patient especially noting any __________________; history of liver, kidney, or heart disease, or endocrine disorders; and note the medications that the patient is currently taking.

        (5) Evaluate the patient's __________________ and __________________ such as electrocardiogram and chest x-ray.

        (6) May order __________________.

    c. The surgical patient should ideally be __________________ for 6-8 hours prior to the induction of anesthesia to prevent __________________ and aspiration of gastric contents.

    d. Preoperative medications are usually given ____________(hours) before surgery.

Written Test

4. Select purposes of preoperative medications by placing an "X" in the appropriate blanks.

_______a. To increase preoperative anxiety

_______b. To produce some amnesia

_______c. To increase secretions in respiratory tract

_______d. To raise the pain threshold

_______e. To assist in easier and smoother induction of anesthesia

_______f. To inhibit nausea and vomiting

5. Complete the following statements concerning the selection of preoperative medications.

a. Selection is made by ____________________.

b. Dependent on patient's ____________________ and ____________________

c. Also dependent on ____________________

6. Complete the following statements concerning classifications of premedications by circling the correct words.

a. Sedatives and tranquilizers (cause, do not cause) drowsiness.

b. Sedatives and tranquilizers (counteract, do not counteract) pain.

c. Diazepam (Valium®) and Midazolam (Versed®) are given for their (antiemetic, sedative) effects.

d. Promethazine (Phenergan®), hydroxyzine (Vistaril®), and droperidol (Inapsine®) are given for their (antiemetic, sedative) effects.

e. Narcotic analgesics (reduce, do not reduce) the perception of pain.

f. Narcotics raise the pain threshold and (decrease, increase) the amount of anesthesia needed during the operation.

g. An example of a synthetic opiate is (Seconal®, Demerol®, morphine sulfate).

h. (Demerol®, Morphine sulfate) is more commonly used because it produces fewer undesirable side effects.

Written Test

i. Narcotics may cause nausea, vomiting, urinary retention, and depression of the (endocrine, respiratory) system.

j. Narcotics (are, are not) capable of causing dependence with regular use and (are, are not) classified as controlled substances by the federal government.

k. Anticholinergic drugs (decrease, increase, have little effect on) mucous secretions in the mouth, respiratory tract, and digestive tract.

l. Anticholinergic drugs (decrease, increase, have little effect on) blood pressure.

m. Anticholinergic drugs (decrease, increase, have little effect on) heart and respiratory rates.

n. Common anticholinergic drugs include atropine and (Sublimaze®, Robinul®).

7. Select true statements concerning anesthesia by placing a "T" or "F" next to the true or false statements.

_____a. Involves the administration of potentially harmless drugs and gases.

_____b. Most general anesthetic agents are flammable.

_____c. Anesthesiologist provides skilled induction, careful maintenance of anesthesia during procedure, and prevents postoperative complications.

d. Anesthesiologist evaluates the following when determining type of anesthetic to use:

_____ (1) Patient's age, condition, and build

_____ (2) Patient's preference

_____ (3) Nature of the operation

_____ (4) Laboratory and X-ray findings

_____ (5) Pre-existing conditions or diseases

_____ (6) In emergency surgery, time since patient's last surgery

Written Test

e. Maintenance of general anesthesia involves:

______ (1) Deepest level of anesthesia must be maintained.

______ (2) Body must be deprived of oxygen.

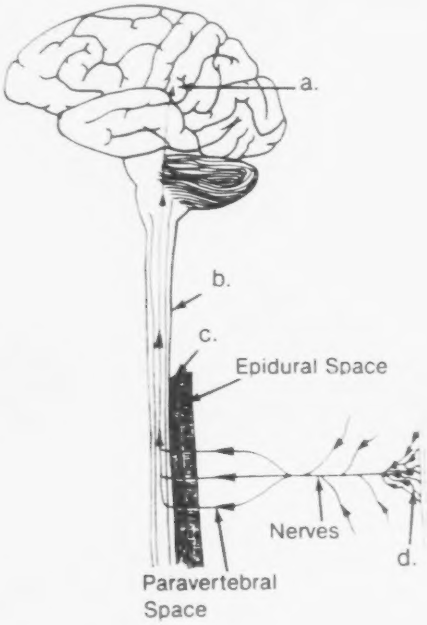
______ (3) Patient remains asleep.

______ (4) Patient is free from pain.

______ (5) Muscle relaxation is not present.

______ (6) Autonomic reflexes are constantly monitored.

8. Identify sites involved in the pathway of pain, and place your answers in the blanks provided.


a.
b.
c.
Epidural Space
Nerves
d.
Paravertebral Space

a. ____________________

b. ____________________

c. ____________________

d. ____________________

Written Test

9. Distinguish among the types of anesthetics by placing the following letters in the correct blanks.

"BA" for balanced anesthesia
"G" for general anesthetic
"L" for local anesthesia
"MAC" for monitored anesthesia care
"R" for regional anesthesia
"S" for spinal anesthesia

_______a. Anesthesiologist monitors patient's vital signs and may supplement the local anesthesia with intravenous drugs that provide sedation and systemic analgesia.

_______b. Permeates the entire body and affects all of its functions.

_______c. Results in loss of consciousness and blockage of the pain-transmitting center of the brain.

_______d. Anesthetic agent is injected in the spinal canal.

_______e. Properties are produced by combining inhalation anesthetic agents with intravenous drugs.

_______f. Pain is controlled by infiltrating the surgical site with a local anesthetic.

_______g. Pain sensation is blocked at a level below the diaphragm.

_______h. Patient remains conscious.

_______i. Pain control is obtained by anesthetizing the sensory nerves in one area or region of the body.

_______j. Anesthesiologist is not involved in the care of the patient. A registered nurse monitors the patient's vital signs and administers sedative or analgesic drugs as ordered by the surgeon.

_______k. Pain control is obtained by infiltrating the surgical site with a local anesthetic.

Written Test

10. Distinguish between methods of administering a general anesthetic by placing the following letters next to the correct characteristics: "INH" for inhalation and "INT" for intravenous.

_____ a. Is injected directly into the bloodstream

_____ b. Involves breathing in anesthesia agents and oxygen which are absorbed into the bloodstream

_____ c. Is used for short surgical procedures or as an induction agent to be immediately followed by inhalation anesthesia

11. List three inhalation agents and two intravenous agents used for general anesthesia.

a. Inhalation

(1) _______________

(2) _______________

(3) _______________

b. Intravenous

(1) _______________

(2) _______________

12. List the four phases of general anesthesia.

a. _______________

b. _______________

c. _______________

d. _______________

Written Test

13. Match types of local or regional anesthetics on the right with the correct descriptions.

_____a. (1) Injected into the cerebrospinal fluid in the subarachnoid space of the lumbar region to block the roots of the spinal nerves; causes massive nerve block and muscle relaxation below the point of injection

(2) Used for surgery on lower portion of the body; injected between 3rd and 4th, or 4th and 5th lumbar vertebrae

_____b. (1) Injected just outside the dura in the epidural space

(2) Used for anesthesia of lower limbs or perineal area, and for relief of prolonged pain as with obstetrical patients

_____c. Injected into spinal nerves as they emerge through the epidural space

_____d. (1) Injected in and around main nerve trunk at a site between operative site and entry of nerve into spinal cord, causing blockage of painful stimuli to the brain

(2) Used for dental work, relief of intractable pain, and procedures on extremities

1. Bier block
2. Epidural block
3. Local infiltration block
4. Nerve block
5. Paravertebral block
6. Spinal block
7. Topical anesthesia

Written Test

______e. (1) Intravenous injection of local anesthetic to an extremity below level of a tourniquet

(2) Used for upper extremity surgery that will last less than an hour

(3) Blood is drained from extremity by compression with a tourniquet; anesthetic drug is injected intravenously

______f. (1) Injected under the skin to anesthetize the nerve endings and nerve fibers

(2) Used for minor surgery, excision of small lesions, and dental work

______g. Directly applied to a mucous membrane to produce insensibility of the nerve endings

14. List three agents used for local or regional anesthesia.

a. ______________________________

b. ______________________________

c. ______________________________

15. Match other anesthetic techniques occasionally used on the right with the correct descriptions.

______a. Involves blocking nerve conduction by means of surface cooling of a localized area

______b. Involves cooling of a part or the entire body

______c. May be used in cardiac and neurosurgery and for burns and leg amputations

______d. Used in topical procedures such as removal of warts and noninvasive surface lesions

1. Cryoanesthesia
2. Hypothermia

Written Test

16. Complete the following statements concerning characteristics of muscle relaxant drugs (neuromuscular blockers) by circling the correct answers.

    a. Muscle relaxant drugs are used because some anesthetic gases used during a procedure render the patient unconscious but (do, do not) produce adequate muscle relaxation.

    b. Muscle relaxants are given in conjunction with the anesthetic gas to allow the degree of muscle (contraction, relaxation) the surgeon needs.

    c. Muscle relaxants are administered intravenously in small dosages at various intervals (before, during) the surgical procedure.

    d. Muscle relaxants interfere with passage of impulses from (motor, sensory) nerves to skeletal muscles.

    e. Using muscle relaxant drugs has (eliminated, initiated) the need for deep inhalation anesthesia to produce muscle relaxation.

    f. The chief danger when using muscle relaxants is (circulatory, respiratory) depression.

17. Distinguish between the types of muscle relaxants by placing an "X" next to the characteristics of depolarizing agents.

_______a. No antagonist is available: the drug must be allowed to wear off by itself

_______b. Act similarly to acetylcholine, but for a longer period of time

_______c. Do not cause muscular fasciculations

_______d. Cause persistent depolarization that produces fasciculations followed by flaccidity

_______e. Common agents used include tubocurarine chloride, gallamine triethiodide, and pancuronium bromide (Pavulon®)

_______f. Common agents used include succinylcholine chloride (Anectine®) and decamethonium bromide (Syncurine®)

_______g. Antagonist used is neostigmine (Prostigmin®)

_______h. Bind to cholinergic receptors to prevent the union of acetylcholine to the receptor

Written Test

18. List four supplemental agents used in conjunction with oxygen to accomplish complete anesthesia.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

19. List two narcotic antagonists used intraoperatively.

a. ______________________________

b. ______________________________

20. List five possible complications of anesthesia.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

21. Select true statements concerning malignant hyperpyrexia-malignant hyperthermia syndrome by placing an "X" in the appropriate blanks.

______a. Is a frequent, life-threatening complication most frequently seen in children and adolescents.

______b. It may be triggered by drugs commonly used in anesthesia.

______c. It is a contagious disease transmitted by direct contact.

______d. Characteristics include generalized contracture of skeletal muscles, marked temperature elevation, tachycardia, metabolic acidosis, cardiac dysrhythmia, and hypoxia.

______e. May occur during induction or maintenance of anesthesia.

______f. Treatment is the immediate infusion of the drug Dantrolene sodium

______g. Relatives of persons with malignant hyperthermia should be evaluated and tested for presence of the disease.

Written Test

22. Distinguish among actions of the surgical team if cardiac arrest occurs on the operating room table by placing the appropriate letters next to their actions.

"A" Anesthesiologist
"S" Surgeon
"CN" Circulating Nurse
"ST" Surgical Technologist

______a. If patient is hemorrhaging, keeps suction tubing and suction tips clear and functioning

______b. Usually directs the resuscitation efforts

______c. Maintains clear airway by suctioning, intubation, or use of a face mask to administer 100% oxygen under intermittent positive pressure

______d. Attempts closed chest compressions

______e. May perform open cardiac massage

______f. Attends to the needs of the surgeon and sterile field

______g. Has syringes of medications filled and ready for use

______h. May do tracheostomy

______i. Activates emergency assistance alarm

______j. Obtains needed equipment such as defibrillator cart ("Crash Cart") and medications

______k. Maintains accuracy of sponge and needle count

______l. If resuscitation measures are unsuccessful, follows hospital policy in regard to death protocol

______m. Remains sterile and protects the sterile field

______n. Accounts for sponges, needles, and instruments

Written Test

23. Match OR anesthesia equipment used for delivering anesthetics with their correct descriptions.

______a. Continuous auscultation of chest sounds to detect pulmonary and cardiac sounds

______b. Device for visualizing and recording electrical activity of the heart

______c. Computers that monitor patient's vital functions; may be noninvasive or invasive

______d. Sensor probe clipped to a pulsating vascular bed that measures arterial hemoglobin oxygen saturation

______e. Special machine used to deliver oxygen and anesthetic gases to the patient through a breathing system

1. Anesthesia machine with gas delivery system
2. E.K.G. (electrocardiogram) monitor
3. Hemodynamic monitors
4. Pulse monitor
5. Stethoscopy
6. Temperature probe

24. Discuss the care of the anesthetized patient.

*Permission to duplicate this test is granted.

Anesthesia
Unit 3-E

Unit Evaluation Form

Student Name ______________________ Unit Rating __________

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ____

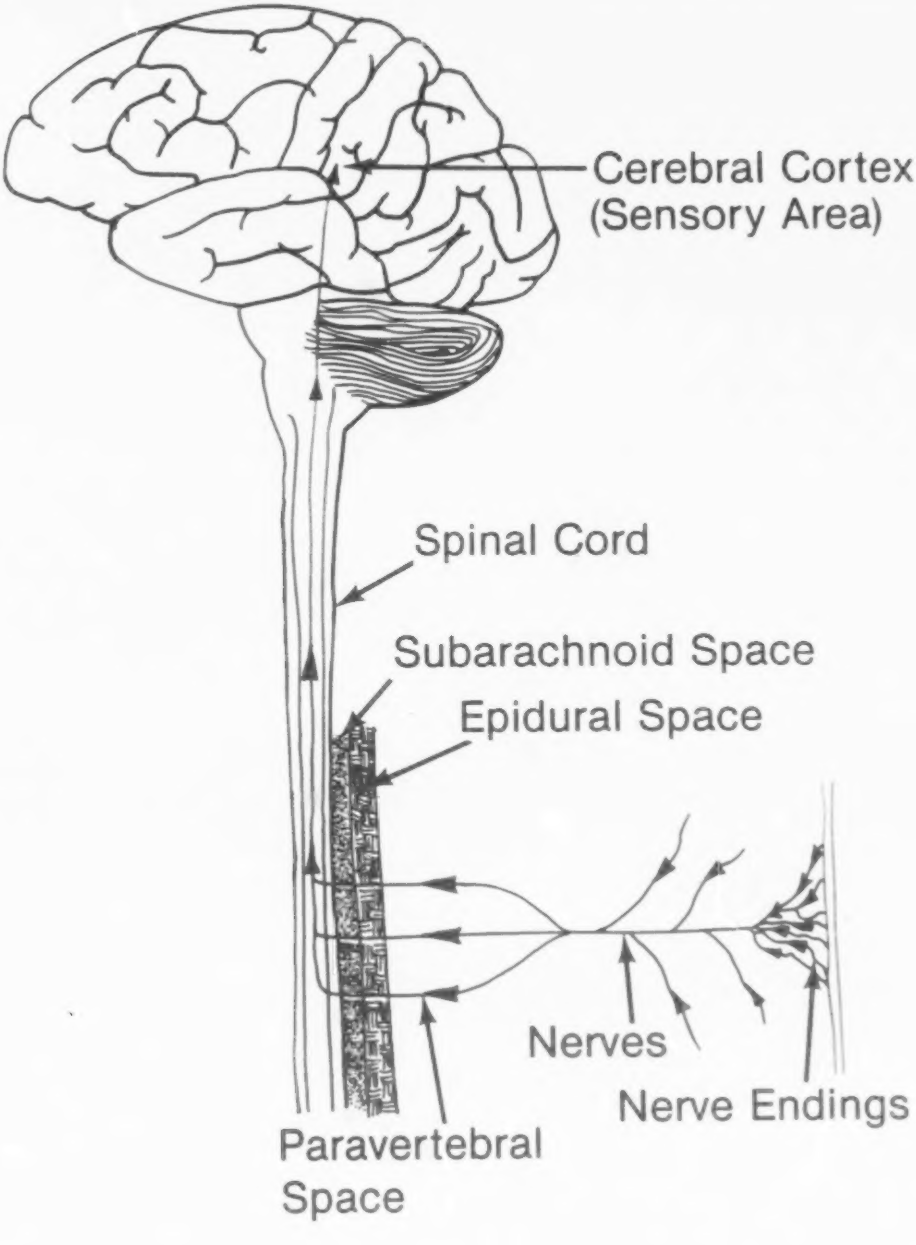
____

Teacher Signature ______________________ Date __________

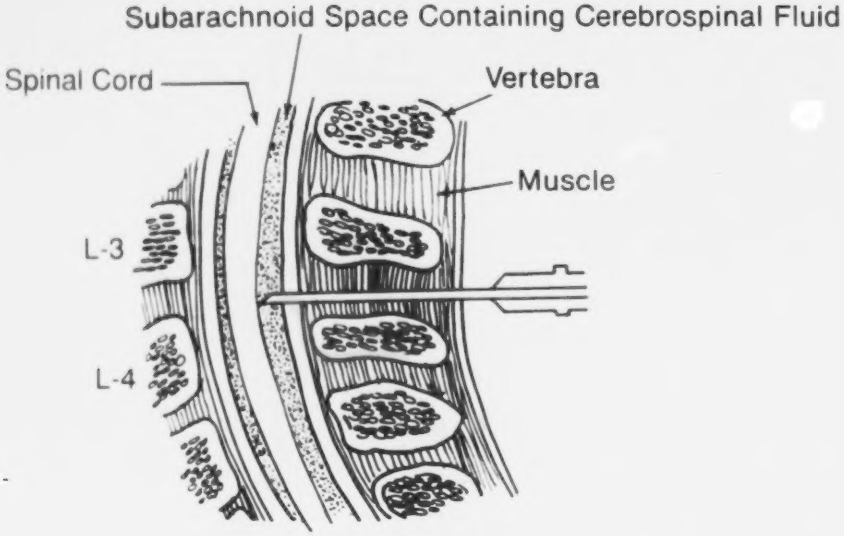
Student Signature ______________________ Date __________

*Permission to duplicate this form is granted.

Pathway of Pain

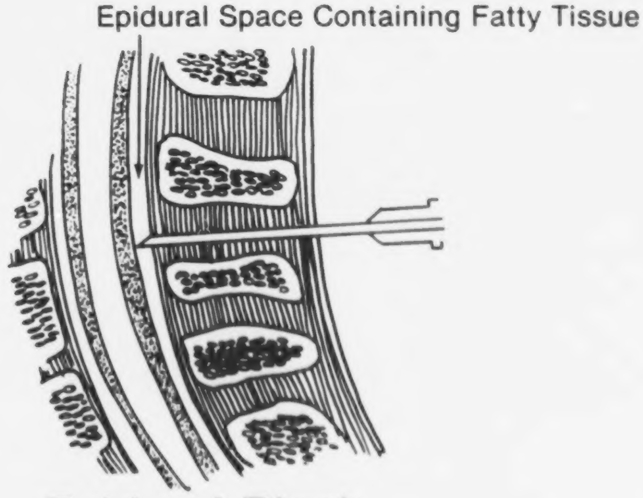

Cerebral Cortex
(Sensory Area)
Spinal Cord
Subarachnoid Space
Epidural Space
Nerves
Nerve Endings
Paravertebral
Space

Spinal and Epidural Anesthesia


Subarachnoid Space Containing Cerebrospinal Fluid
Spinal Cord
Vertebra
Muscle
L-3
L-4

Spinal Block

Injection into Subarachnoid Space


Epidural Space Containing Fatty Tissue

Epidural Block

Injection into Epidural Space

Anesthesia
Unit 3-E

Information Sheet

1. **Terms and definitions**

   a. **Amnesia** — Loss of memory

   b. **Analgesia** — Decrease of or insensibility to pain

   c. **Anesthesia** — The absence of essentially all sensation

   d. **Anesthesia technician** — Person who assists the anesthesiologist or anesthetist

   e. **Anesthesiologist** — A medical physician who is a specialist in the field of anesthesiology

   f. **Anesthesiology** — The branch of medical science concerned with the administration of anesthetics and the condition of the patient while under anesthesia

   g. **Anesthetic** — Agent that produces anesthesia

   h. **Anesthetist** (Certified registered nurse anesthetist {CRNA}) — A registered nurse who has taken a two-year course in anesthesiology and is certified to administer anesthetics and work under supervision of the anesthesiologist

   i. **Antagonist** — Drug that counteracts the action of something else

   j. **Antiemetic** — Agent that prevents or relieves nausea and vomiting

   k. **Endotracheal** — Within the trachea

   Note: An endotracheal tube may be placed in the trachea to keep the airway patent during the surgical procedure.

   l. **Extubation** — Removal of endotracheal tube

   m. **Fasciculation** — Muscular twitching involving contiguous groups of muscle fibers

   n. **Flaccid** — Lacking vigor or firmness; flabby

Information Sheet

o. **General anesthesia** — A state of reversible unconsciousness produced by anesthetic agents in which motor, sensory, mental, and reflex functions are temporarily lost

p. **Intubation** — Insertion of endotracheal tube

q. **Local** — Limited to one place or part

r. **Narcosis** — Unconscious state due to narcotics

s. **Regional anesthesia** — A part of the body is insensitive to pain; caused by an interruption of the sensory nerve pathways that supply the area

2. **The ideal anesthetic agent**

   a. **For the patient**, the ideal anesthetic agent is rapid-acting, easily reversed, and provides analgesia extending into postoperative period.

   b. **For the surgeon**, the ideal anesthetic agent produces good muscular relaxation and minimum side effects.

   c. **For the anesthesiologist**, the ideal anesthetic agent has a wide margin of safety, leaves the body unaltered, is potent, allows a high percentage of oxygen to be used, and has a low level of toxicity.

3. **Preanesthetic preparation of the patient**

   a. Preoperative anesthesia assessment should be made by the anesthesia representative before the scheduled surgery.

   b. The anesthesia representative will perform the following tasks during the preoperative visit:

      (1) Explain to the patient basically what will be done in surgery concerning anesthesia.

      (2) Explain the effects of the anesthesia.

      (3) Inform the patient of possible side effects and complications from the anesthesia.

      (4) Allow the patient to ask questions concerning his/her anesthetic care to alleviate possible fears.

Information Sheet

        (5) Perform a brief history and physical on the patient especially noting any allergies; history of liver, kidney, or heart disease, or endocrine disorders; and note the medications that the patient is currently taking.

        (6) Evaluate the patient's laboratory data and diagnostic studies such as electrocardiogram and chest x-ray.

        (7) May order preoperative medications.

    c. The surgical patient should ideally be NPO for 6-8 hours prior to the induction of anesthesia to prevent vomiting and aspiration of gastric contents.

    d. Preoperative medications are usually given one hour before surgery, but may be given intravenously after the patient arrives in the surgical suite.

4. **Purposes of preoperative medications**
    a. To relieve preoperative anxiety and apprehension
    b. To produce some amnesia
    c. To decrease secretions in respiratory tract
    d. To raise the pain threshold
    e. To assist in easier and smoother induction of anesthesia
    f. To inhibit nausea and vomiting

5. **Selection of preoperative medications**
    a. Selection is made by anesthesiologist.
    b. Dependent on patient's:
        (1) Physical condition
        (2) Emotional status
        (3) Age
        (4) Weight
    c. Also dependent on:
        (1) Degree of relaxation necessary
        (2) Anesthesiologist's own personal preference

Information Sheet

6. Classifications of premedications

a. Sedatives and tranquilizers

(1) Given to reduce anxiety, for sedation, and antiemetic effect; cause drowsiness, but do not counteract pain.

(2) Drugs which produce excellent amnesia, mild sedation, and reduced anxiety include:

(a) Diazepam (Valium®).
(b) Midazolam (Versed®).

(3) Drugs which minimize nausea and vomiting include:

(a) Promethazine (Phenergan®).
(b) Hydroxyzine (Vistaril®).
(c) Droperidol (Inapsine®).

b. Narcotic analgesics

(1) Given to reduce the perception of pain; raise the pain threshold and decrease the amount of anesthesia needed during the operation

(2) Are divided into groups:

(a) Opiates — Morphine sulfate — Not commonly used because it causes deep narcosis, respiratory depression, and sometimes nausea and vomiting.
(b) Synthetic opiates

- Meperidine hydrochloride (Demerol®) is more commonly used because it produces fewer undesirable side effects than morphine and gives good analgesia.

- Fentanyl (Sublimaze®) is faster-acting and of shorter duration than morphine or Demerol®.

(3) Side effects of narcotics:

(a) Are respiratory depressants.
(b) May cause nausea, vomiting, and urinary retention.
(c) Capable of causing dependence with regular use and are classified as controlled substances by the federal government.

Information Sheet

c. **Anticholinergic (antimuscarinic) drugs**

  (1) Are given for their parasympathetic depressant action

  (2) Inhibit mucous secretions in the mouth, respiratory tract, and digestive tract

  (3) Increase heart and respiratory rates and are bronchodilators.

  (4) Have little effect on blood pressure

  (5) Common anticholinergic drugs include:

    (a) Atropine sulfate
    (b) Glycopyrrolate (Robinul®).
    (c) Scopolamine hydrobromide (Scopolamine®).

    Note: This is more frequently given as a supplement during the operation than as a premedication because it may produce excitement, rage, and hallucinations.

7. **Factors concerning anesthesia**

a. Anesthesia involves the administration of potentially lethal drugs and gases.

b. Today's general anesthetic agents are not flammable.

Note: The older anesthetic agents such as ether, chloroform, and cyclopropane (orange tank) were flammable.

c. Anesthesiologist provides skilled induction, careful maintenance of anesthesia during procedure, and prevents postoperative complications.

d. Anesthesiologist evaluates the following when determining type of anesthetic to use:

  (1) Patient's age, condition, and build

  (2) Nature of the operation

  (3) Anticipated length of the operation

  (4) Laboratory and X-ray findings

  (5) Pre-existing conditions or diseases

  Examples: Heart disease, allergies

  (6) In emergency surgery, time since patient's last meal

Information Sheet

e. Maintenance of general anesthesia involves:

(1) Lightest level of anesthesia is maintained.

(2) Body must not be deprived of oxygen.

(3) Patient remains asleep.

(4) Patient is free from pain.

(5) Muscle relaxation must be present.

Note: Proper amounts of muscle relaxation drugs are administered to provide adequate muscle relaxation throughout the procedure.

(6) Autonomic reflexes are constantly monitored.

Note: Anesthetic agents affect the cardiovascular and respiratory system.

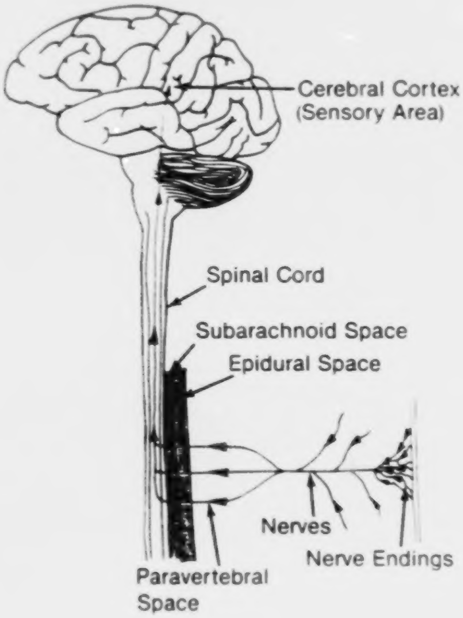
Information Sheet

8. Pathway of pain

From nerve endings in a wound → to the nerves → through the paravertebral space → through the epidural space → through the subarachnoid space → to the spinal cord → to the cerebral (sensory) cortex of the brain

Note: The passage of the impulse can be interrupted at any site along the route. The site selected to stop the nerve impulse will determine the type of anesthetic given.

Figure 1


Cerebral Cortex
(Sensory Area)
Spinal Cord
Subarachnoid Space
Epidural Space
Nerves
Nerve Endings
Paravertebral
Space

9. Types of anesthetics

a. **General anesthetic**

(1) Permeates the entire body and affects all of its functions.

(2) Is transported by way of the bloodstream.

(3) Results in loss of consciousness and blockage of the pain-transmitting center of the brain.

(4) Results in an immobile, quiet patient who does not remember the operative procedure.

Information Sheet

b. **Balanced anesthesia** — Properties of general anesthesia are produced by combining inhalation anesthetic agents with intravenous drugs.

c. **Spinal anesthesia**

   (1) Pain sensation is blocked at a level below the diaphragm.

   (2) Anesthetic agent is injected in the spinal canal.

   (3) Patient remains conscious.

d. **Regional anesthesia**

   (1) Pain control is obtained by anesthetizing the sensory nerves in one area or region of the body.

   (2) Patient remains conscious.

e. **Local anesthesia**

   (1) Pain is controlled by infiltrating the surgical site with a local anesthetic.

   (2) Patient remains conscious.

   (3) Anesthesiologist is not involved in the care of the patient. A registered nurse monitors the patient's vital signs and administers sedative or analgesic drugs as ordered by the surgeon.

f. **Monitored anesthesia care** (local standby or anesthesia standby)

   (1) Pain control is obtained by infiltrating the surgical site with a local anesthetic.

   (2) Anesthesiologist may supplement the local anesthesia with intravenous drugs that provide sedation and systemic analgesia.

   Note: The anesthesiologist monitors the patient's vital signs. This technique may be used for critically ill patients who may not tolerate general anesthesia or for patients undergoing minor procedures.

Information Sheet

10. **Methods of administering a general anesthetic**

    a. **Inhalation** — Unconsciousness is induced by the patient breathing in anesthesia agents and oxygen which are absorbed into the bloodstream.

    b. **Intravenous**

        (1) Unconsciousness is induced by intravenous administration of a drug directly into the bloodstream.

        (2) Produces rapid, pleasant general anesthesia

        (3) Does not cause muscle relaxation

        (4) Is used for short surgical procedures or as an induction agent to be immediately followed by inhalation anesthesia

11. **Agents used for general anesthesia**

    a. **Inhalation anesthesia agents**

        (1) Halothane (Fluothane®)

        (2) Enflurane (Ethrane®)

        (3) Isoflurane (Forane®)

        (4) Methoxyflurane (Penthrane®)

        (5) Nitrous oxide (N_2O)

        Note: Ether, chloroform, and cyclopropane (in orange tank) are rarely used today because they are flammable and have undesirable side effects. .

    b. **Intravenous anesthesia agents**

        (1) Thiopental sodium (pentothal sodium)

        (2) Thiamylal sodium (Surital®)

        (3) Methohexital sodium (Brevital®)

        (4) Propofol (Diprivan®)

        (5) Ketamine hydrochloride (Ketalar®, Ketaject®)

Information Sheet

12. **Phases of general anesthesia**

    a. **Induction**

        (1) Begins with administration of anesthetic agents; continues until surgical procedure begins.

        (2) Patient is intubated with endotracheal tube.

    b. **Maintenance**

        (1) Begins with surgical procedure; continues and ends with completion of procedure.

        (2) Accomplished with inhalation agents or intravenous agents.

    c. **Emergence**

        (1) Begins when patient begins to emerge from anesthesia and ends when patient is ready to leave the operating room.

        (2) Extubation of the patient is usually performed.

    d. **Recovery** — Begins when patient enters post-anesthesia recovery unit and ends when patient becomes responsive.

Information Sheet

13. Types of local or regional anesthetics

a. Spinal block

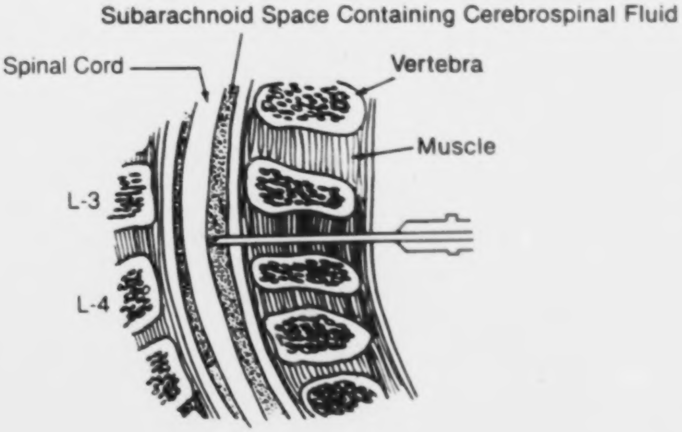
(1) Injected into the cerebrospinal fluid (CSF) in the subarachnoid space of the lumbar region to block the roots of the spinal nerves; causes massive nerve block and muscle relaxation below the point of injection

(2) Injected between 3rd and 4th, or 4th and 5th lumbar vertebrae

(3) Used for surgery on lower portion of the body

> **Caution: Patient should never be placed in Trendelenburg position when this type of anesthetic is used.**

Figure 2—Spinal block


Subarachnoid Space Containing Cerebrospinal Fluid
Spinal Cord
Vertebra
Muscle
L-3
L-4

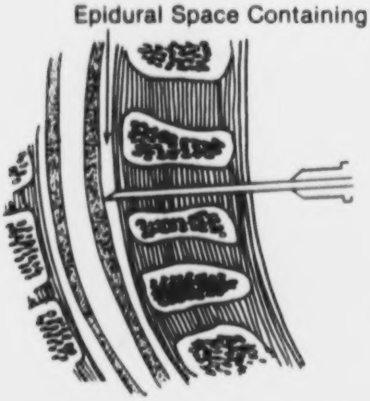
Information Sheet

b. **Epidural block**

(1) Injected just outside the dura in the epidural space

(2) Used for anesthesia of lower limbs or perineal area, and for relief of prolonged pain as with obstetrical patients

Figure 3—Epidural block



c. **Paravertebral block** — Injected into spinal nerves as they emerge through the epidural space

d. **Nerve block or field block**

(1) Injected in and around main nerve trunk at a site between operative site and entry of nerve into spinal cord, causing blockage of painful stimuli to the brain

(2) Used for dental work, relief of intractable pain, and procedures on extremities

Examples: Digital block for entire finger, brachial block for entire hand and wrist

e. **Bier block**

(1) Intravenous injection of local anesthetic to an extremity below level of a tourniquet

(2) Used for upper extremity surgery that will last less than an hour

(3) Blood is drained from extremity by compression with a tourniquet; anesthetic drug is injected intravenously

(4) Extremity remains painless as long as tourniquet is inflated.

Information Sheet

f. **Local infiltration block**

   (1) Injected under the skin to anesthetize the nerve endings and nerve fibers

   (2) Used for minor surgery, excision of small lesions, and dental work

   Note: A vasoconstrictor is commonly used with a local anesthetic to prevent it from being carried away from the injection site.

g. **Topical anesthesia** — Directly applied to a mucous membrane to produce insensibility of the nerve endings

14. **Agents used for local or regional anesthesia**

a. Cocaine hydrochloride (cocaine) (only for topical application)

b. Procaine hydrochloride (Novocain®)

c. Lidocaine hydrochloride (Xylocaine®, lignocaine)

Note: This is one of the most widely used local anesthetic agents.

d. Tetracaine hydrochloride (Pontocaine®)

e. Mepivacaine hydrochloride (Carbocaine®)

f. Bupivacine hydrochloride (Marcaine®, Sensorcaine®)

g. Hyaluronidase (Wydase®)--Added to local anesthetics to facilitate its action

Note: Epinephrine (Adrenalin®) may be added to local anesthetics for its vasoconstriction action. There are other local anesthetic agents for various uses in addition to the common ones listed here.

Information Sheet

15. Other anesthetic techniques occasionally used

a. **Cryoanesthesia**

(1) Involves blocking nerve conduction by means of surface cooling of a localized area

(2) Used in topical procedures such as removal of warts and noninvasive surface lesions

b. **Hypothermia**

(1) Involves cooling of a part or the entire body

(2) Generalized hypothermia causes decrease in all metabolic processes with slowing of circulatory rate and decrease of oxygen requirements.

(3) Equipment involved is the hypothermia blanket, coolant, thermometer, and hypothermia machine.

(4) May be used in cardiac and neurosurgery and for burns and leg amputations

16. Characteristics of muscle relaxant drugs (neuromuscular blockers)

a. Used because some anesthetic gases used during a procedure render the patient unconscious but do not produce adequate muscle relaxation.

b. Are given in conjunction with the anesthetic gas to allow the degree of muscle relaxation the surgeon needs.

c. Administered intravenously in small dosages at various intervals during the surgical procedure.

d. Interferes with passage of impulses from motor nerves to skeletal muscles.

e. Use has eliminated the need for deep inhalation anesthesia to produce muscle relaxation.

f. Chief danger is respiratory depression because all skeletal muscles are paralyzed, including the diaphragm and accessory muscles of respiration.

Information Sheet

17. Types of muscle relaxants

a. **Non-depolarizing agents**

(1) Prevent muscle contractions

(2) Bind to cholinergic receptors to prevent the union of acetylcholine to the receptor

(3) Do not cause muscular fasciculations

(4) Common agents include:

(a) Tubocurarine chloride (Curare)
(b) Gallamine triethiodide (Flaxedil®)
(c) Pancuronium bromide (Pavulon®)
(d) Vecuronium bromide (Norcuron®)
(e) Atracurium besylate (Tracrium®)

(5) Antagonist used is neostigmine (Prostigmin®).

b. **Depolarizing agents**

(1) Act similarly to acetylcholine, but for a longer period of time

(2) Cause persistent depolarization that produces fasciculations followed by flaccidity

(3) Common agents include:

(a) Succinylcholine chloride (Anectine®, Quelicin®, Gucostrin®).)
(b) Decamethonium bromide (Syncurine®).

(4) No antagonist is available; the drug must be allowed to wear off by itself.

Information Sheet

18. **Supplemental agents used in conjunction with oxygen to accomplish complete anesthesia**

    Note: These may be administered intraoperatively on short procedures.

    a. **Narcotic agents**

        (1) Morphine sulfate

        (2) Fentanyl (Sublimaze®)

        (3) Sufentanil citrate (Sufenta®)

        (4) Alfentanil (Alfenta®)

        (5) Meperidine hydrochloride (Demerol®)

    b. **Tranquilizing agents**

        (1) Diazepam (Valium®)

        (2) Droperidol (Inapsine®)

19. **Narcotic antagonists used intraoperatively**

    Note: An antagonist drug cancels the action of another drug or reverses its effects. Narcotic (opiate) antagonists can reverse respiratory depression produced by narcotics.

    a. Naloxone hydrochloride (Narcan®)

    b. Nalbuphine hydrochloride (Nubain®)

    c. Butorphanol tartrate (Stadol®)

    d. Pentazocine hydrochloride (Talwin®)

    e. Burenorphine hydrochloride (Buhrenex®)

Information Sheet

20. Possible complications of anesthesia

a. Excitement

b. Respiratory obstruction

c. Bronchospasm or laryngospasm

d. Vomiting and aspiration

e. Damage to teeth or dental work

f. Eye injury due to drying of cornea

g. Reaction to drugs or blood transfusions

h. Injury to nerves due to improper positioning

i. Fluid and electrolyte imbalance

j. Hypothermia

k. Shock (neurogenic, secondary to trauma or hemorrhage)

l. Cerebral complications:

  (1) Cerebral vascular accident

  (2) Convulsions

  (3) Delirium

m. Cardiac arrest

n. Malignant hyperthermia

Information Sheet

21. Malignant hyperpyrexia — malignant hyperthermia syndrome

a. Is a rare, life-threatening complication most frequently seen in children and adolescents which may be triggered by drugs commonly used in anesthesia.

Note: Succinylcholine and the volatile anesthetic agents, especially halothane, are the most frequently implicated triggering agents.

b. In the past, mortality ranged from 50% to 80%, but proper treatment has significantly reduced the incidence of fatalities and complications.

c. It is genetically transmitted as a dominant trait.

d. Characteristics include generalized contracture of skeletal muscles, marked temperature elevation, tachycardia, metabolic acidosis, cardiac dysrhythmia, and hypoxia.

  (1) The body temperature may increase one degree every five minutes.

  (2) Temperatures greater than 109.4 degrees have been reported.

e. May occur during induction or maintenance of anesthesia, but can also occur postoperatively.

f. All OR personnel should be familiar with the protocol for its management.

g. Treatment is the immediate infusion of the drug Dantrolene sodium, which is a skeletal muscle relaxant.

h. Patients known or suspected to have this syndrome can be anesthetized with minimal risk if appropriate precautions are taken. (Dantrolene is administered preoperatively.)

i. Relatives of persons with malignant hyperthermia should be evaluated and tested for presence of the disease.

Information Sheet

22. **Actions of surgical team if cardiac arrest occurs on the operating room table**

    a. **Anesthesiologist**

        (1) Usually directs the resuscitation efforts

        (2) Delivers orders and makes decisions concerning medications and defibrillation

        (3) Maintains clear airway by suctioning, intubation, or use of a face mask to administer 100% oxygen under intermittent positive pressure

    b. **Surgeon**

        (1) Works together with anesthesiologist in resuscitation

        (2) Attempts closed chest compressions

        (3) May inject heart with stimulants

        (4) May perform open cardiac massage

        Note: The surgeon will need a knife to make the incision and a chest retractor to continue for any length of time.

        (5) May do tracheostomy

    c. **Circulating nurse**

        (1) Records time of arrest

        (2) Activates emergency assistance alarm

        (3) Obtains needed equipment such as defibrillator cart ("Crash Cart") and medications

        (4) Documents all medication given, including the time given and dosage

        (5) Maintains accuracy of sponge and needle count

        (6) Maintains sterile technique

        Note: Sterility is secondary to resuscitation efforts.

        (7) Assists wherever needed

        (8) If resuscitation measures are unsuccessful, follows hospital policy in regard to death protocol

Information Sheet

d. **Surgical technologist/scrub nurse**

(1) Remains sterile and protects the sterile field

(2) Should arrest occur during the operative procedure, wound is packed with sterile drapes, and patient is repositioned for CPR

(3) If surgeon decides to close wound during resuscitation efforts, closing suture must be accessible.

(4) Accounts for sponges, needles, and instruments

Note: Counts are completed and wound is closed despite outcome.

(5) Attends to the needs of the surgeon and sterile field

(6) Has syringes of medications filled and ready for use

(7) If patient is hemorrhaging, keeps suction tubing and suction tips clear and functioning

23. **OR anesthesia equipment**

a. **Anesthesia machine with gas delivery system** — Special machine used to deliver oxygen and anesthetic gases to the patient through a breathing system; has devices for monitoring the blood pressure, electrocardiogram, oxygen levels, and an alarm system to signal apnea or disconnection of the breathing circuit

Note: Oxygen cylinders, hoses, and flowmeters are color-coded green. Nitrous oxide cylinders, hoses, and flowmeters are color-coded blue.

b. **E.K.G. (electrocardiogram) monitor** — Device for visualizing and recording electrical activity of the heart

c. **Hemodynamic monitors** — Computers that monitor patient's vital functions (ex: blood pressure, heart rate, blood flow, vascular volumes, blood properties, and cardiac function); may be noninvasive or invasive

Note: Noninvasive monitors do not penetrate the body such as sphygmomanometer (blood pressure cuff). Invasive monitors penetrate skin or enter a body cavity. An example is an indwelling catheter which converts the pressure within arteries and veins into electrical activity which is displayed on a monitor screen.

d. **Pulse monitor** — Sensor probe clipped to a pulsating vascular bed (finger, toe, earlobe, or over bridge of nose) that measures arterial hemoglobin oxygen saturation

Information Sheet

e. **Stethoscopy** — Continuous auscultation of chest sounds to detect pulmonary and cardiac sounds, by taping a stethoscope over the precordium (the region over heart and stomach at level of the diaphragm) or by placing a detector within a patient's esophagus (esophageal stethoscope)

f. **Temperature probe** — Device used to monitor patient's temperature

24. Care of the anesthetized patient

a. Patients must be positioned properly to avoid pressure points, compression of nerves, or interference of respirations or circulation to an extremity. DO NOT LEAN ON THE PATIENT DURING SURGERY.

b. Change patient's position slowly and gently to allow for adjustment of circulatory system.

c. Patients must be transferred to the carrier carefully and gently to avoid straining muscles and ligaments; the anesthesiologist protects the patient's neck and head.

d. Since hearing is the last sensation to succumb to anesthesia, OR personnel must be aware that surgical patients are very vulnerable to auditory stimuli. Avoid room noise and conversations.

Anesthesia
Unit 3-E

Student Supplement 1—Review Anesthesia in a Multiple-Choice Format

Name ______________________________ Date ______________

Directions: Complete the following statements by placing the correct letters in the blanks provided.

______ 1. Which of the following is NOT appropriate treatment for hypotension from spinal anesthesia?

a. Place patient in head-up position to keep spinal from going higher.
b. Give five liters/minute nasal oxygen.
c. Infuse 200 ml. of Ringer's lactate solution quickly.
d. Place patient in head-down position.

______ 2. An example of an anticholinergic drug or combination given preoperatively to inhibit mucous secretions is:

a. Atropine and Robinul®
b. Demerol®
c. Cocaine
d. Xylocaine 1% with Epinephrine

______ 3. The type of anesthetic technique in which medication is injected under the skin to anesthetize the nerve endings and nerve fibers is called a/an ______ anesthetic.

a. Topical
b. Local
c. Epidural
d. Spinal block

______ 4. What action(s) should the OR personnel be prepared to take should the patient vomit?

a. Provide suction.
b. Turn the patient's head to the side.
c. Adjust table into Trendelenburg position.
d. All of the above

______ 5. Sensorcaine® and Bupivacine are other names for a drug used as a local anesthetic. The name of the drug is:

a. Tetracaine
b. Pontocaine®
c. Marcaine®
d. Xylocaine®

Student Supplement 1

______ 6. When a local anesthetic is being used in the OR,

- a. A registered nurse must check the label with the surgical technologist.
- b. The circulator assumes full responsibility once the anesthetic is on the sterile field.
- c. The registered nurse dispenses it directly to the surgeon.
- d. The surgeon checks the label when it is poured.

______ 7. The type of anesthetic in which medication is injected in and around the main nerve trunk at a site between the operative site and entry of nerve into spinal cord, causing blockage of painful stimuli to the brain, is called a ______ type of anesthesia.

- a. Nerve block or field block
- b. Local
- c. Epidural
- d. Topical

______ 8. During a gas anesthetic induction, the noise level

- a. Is unimportant.
- b. Should be kept low because the sense of hearing is the last sense to be lost before the patient is rendered unconscious, and the patient is easily stimulated during Stage 2 of anesthesia.
- c. Must be kept down so as not to make the surgeon angry.
- d. Should be kept low to avoid getting in trouble with the circulating nurse.

______ 9. The purpose of the narcotic analgesics is to:

- a. Prevent nausea.
- b. Prevent vomiting.
- c. Reduce the perception of pain.
- d. Cause drowsiness and reduce anxiety.

______ 10. Except in emergency situations, the minimum number of hours a patient may eat or drink prior to surgery is ______ hours.

- a. 1
- b. 4
- c. 8
- d. 12

______ 11. Malignant hyperthermia can be triggered by any volatile anesthetic agent, but the onset is more abrupt with:

- a. Succinylcholine and halothane
- b. Nitrous oxide
- c. Pancuronium
- d. Dantrolene sodium

Student Supplement 1

_______12. Fentanyl (Sublimaze®) is classified as a/an:

a. Barbiturate
b. Narcotic
c. Tranquilizer
d. Anticholinergic

_______13. Muscle relaxants (neuromuscular blockers) are given during surgery to:

a. Cause paralysis
b. Produce jaw relaxation during intubation
c. Facilitate tissue manipulation
d. All of the above

_______14. The purpose of preoperative medication is:

a. To produce some amnesia and raise the pain threshold
b. To inhibit nausea and vomiting
c. To assist in easier and smoother induction of anesthesia
d. All of the above

_______15. After the preoperative medication, patients frequently complain of have a dry mouth. The best response to this problem would be:

a. "Don't worry about it; you'll be going to sleep in a few minutes."
b. "I'll get you a drink of water."
c. Just ignore the patient.
d. "The medication you received had something in it to make your mouth dry."

_______16. A drug given to treat severe bradycardia hypotension is:

a. Lasix®
b. Calcium chloride
c. Lidocaine
d. Atropine sulfate

_______17. An example of a synthetic opiate that is most commonly used as a preoperative medication is:

a. Sublimaze®
b. Demerol® (meperidine hydrochloride)
c. Morphine sulfate
d. Atropine

Student Supplement 1

______18. Which term indicates low or decreased blood volume?

a. Anoxemia
b. Hypovolemia
c. Hypoxia
d. Hypocalcemia

______19. The type of local or regional anesthetic in which medication is directly applied to a mucous membrane or a specific area to produce insensibility of the nerve endings is called ______ anesthesia.

a. Epidural
b. Local
c. Topical
d. Nerve block

______20. The most widely used medication for a local anesthesia is:

a. Cocaine
b. Procaine
c. Lidocaine
d. Marcaine®

______21. Extubation of the endotracheal tube of the anesthetized patient may initiate:

a. Bronchospasms
b. Laryngospasms
c. Vomiting
d. All of the above

______22. Once the diagnosis of malignant hyperthermia is made, vigorous treatment must be immediately instituted, including:

a. Termination of anesthesia or change of technique
b. Manual hyperventilation of the patient with 100% oxygen
c. Change the soda lime canister, anesthesia hoses, and mask to eliminate traces of a triggering agent, and administration of Dantrolene
d. All of the above

______23. An intravenous agent used for anesthesia induction is

a. Lidocaine
b. Fluothane®
c. Pentothal sodium
d. Demerol®

Student Supplement 1

______24. The surgical technologist's primary responsibility when the patient experiences a cardiac arrest on the operating room table is:

a. Break sterile technique and get the crash cart.
b. Maintain a clear airway.
c. Stand by to assist when needed.
d. Remain sterile and protect the sterile field.

______25. An anesthetic complication characterized by progressive elevation of body temperature is known as:

a. Malignant hypothermia
b. Malignant hypervolemia
c. Malignant hypovolemia
d. Malignant hyperthermia

______26. ______ is the drug necessary to treat malignant hyperthermia.

a. Adrenalin®
b. Dantrolene
c. Digitoxin
d. Epinephrine

______27. Oxygen cylinders, hoses, and flowmeters are color-coded ______. Nitrous oxide cylinders, hoses, and flowmeters are color-coded ______.

a. Orange, blue
b. Green, blue
c. Blue, green
d. Gray, blue

______28. Dark blood in the operative field may indicate that the patient is:

a. Hyperkalemic
b. Hypovolemic
c. Hypotensive
d. Hypoxic

______29. Spinal and epidural anesthesia are examples of:

a. Bier block anesthesia
b. Regional anesthesia
c. General anesthesia
d. Topical anesthesia

______30. Which of the following drugs may be given as a muscle relaxant?

a. Anectine®
b. Demerol®
c. Lidocaine
d. Morphine

Anesthesia
Unit 3-E

Student Supplement 2—Review Anesthesia in a True-False Format

Name ______________________________ Date ______________

Directions: Circle T or F to indicate if the statement is true or false.

T F 1. During a general anesthetic, the patient remains conscious.

T F 2. The inhalation method of anesthesia involves breathing in vaporized liquids or gases which are absorbed into the bloodstream.

T F 3. Sedatives and tranquilizers are used to counteract pain.

T F 4. In spinal anesthesia the level of anesthesia can be determined by the amount of anesthetic agent injected and the patient's position during and immediately following injection.

T F 5. Improper positioning while anesthetized may result in injury to any of the following systems: integumentary, musculoskeletal, respiratory, and circulatory.

T F 6. A spinal block is a regional anesthesia which is injected into the subarachnoid space of the lumbar region to block the roots of the spinal nerves, which causes massive nerve blockage and muscle relaxation below the point of injection.

T F 7. Common anticholinergic drugs given preoperatively to dry up secretions are Demerol® and Sublimaze®.

T F 8. Patients emerging from inhalation anesthesia, in particular from halothane, may shiver because halothane depresses the hypothalamus of the brain which controls body temperature.

T F 9. Preparation for induction of anesthesia should include readiness for suctioning. The circulator should check to make sure suction is on or within reach of the anesthesiologist prior to beginning induction.

T F 10. Tranquilizers may be given preoperatively to counteract pain.

T F 11. The surgical patient should ideally be NPO for 24 hours prior to the induction of anesthesia to prevent vomiting and aspiration of gastric contents.

T F 12. During a "crash induction" of anesthesia, the nurse assisting the anesthesiologist should be ready to apply cricoid pressure to the patient to prevent aspiration of gastric secretions.

T F 13. Narcotics may be given intraoperatively to provide relief of pain postoperatively.

Student Supplement 2

T F 14. Patients should always be placed in Trendelenburg position when they are given a spinal block form of anesthesia.

T F 15. Cocaine is commonly used as a topical anesthetic agent in obstetric procedures.

T F 16. Anectine®, a muscle relaxant, is used because some anesthetic gases used during a procedure render the patient unconscious, but do not produce adequate muscle relaxation.

T F 17. Hallucinations may be an adverse reaction experienced by patients following the use of Ketamine anesthesia.

T F 18. General anesthesia is preferred for labor and delivery.

T F 19. Vomiting is considered a complication of anesthesia because the patient may aspirate the stomach contents into the lungs that results in aspiration pneumonia, which can be fatal.

T F 20. Sedatives and tranquilizers cause drowsiness.

T F 21. Balanced anesthesia is a term used to describe a technique in which a patient receives a combination of drugs to provide muscle relaxation, analgesia, and sleep.

T F 22. During a preoperative visit, the anesthesiologist performs a brief history and physical on the patient. It is important that the anesthesiologist notes if the patient or any of the family has a history of problems when receiving an anesthetic.

T F 23. During a local or regional anesthesia, pain is controlled without loss of consciousness by anesthetizing the area of the body that the surgery is going to be performed on.

T F 24. Inhalation and intravenous agents should never be used in combination to achieve general anesthesia.

T F 25. Narcotic analgesics are given as a preoperative medication to reduce the perception of pain.

T F 26. Induction of anesthesia is always begun with an intravenous agent.

T F 27. "Jerks" is the term to denote muscle contractions that appear similar to twitching.

T F 28. General anesthesia results in a loss of consciousness.